Motorcraft

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FORD MICROPROCESSOR CONTROL UNIT (MCU) SYSTEM (1980-1986 UPDATE)

The content of this Bulletin provides information on the components, operation, and diagnosis of the 1980-86 Ford Microprocessor Control Unit (MCU) system. Early information on the MCU system was contained in Motorcraft Service News Bulletin 82-26.

For complete diagnostic procedures and additional information refer to the Ford Shop Manual "Emission Diagnosis, Engine/Electronics, Volume H" and the Electrical and Vacuum Troubleshooting Manual for the vehicle model involved. These manuals may be purchased from Helm Inc., P.O. Box 07150, Detroit, Michigan 48207.

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FORD MICROPROCESSOR CONTROL UNIT (MCU)

INTRODUCTION

This text will help to explain basic operating strategies and characteristics of the MCU system. It will also provide a description of the system, key highlights, and information on systems variations. This Bulletin is intended to be used as a guide only and not as a substitute for the "Emission Diagnosis, Engine/ Electronics" Ford Shop Manual, Volume H.

The microprocessor control unit (MCU) system was introduced in 1980 on the California 2.3 liter engine. Since then, the MCU system has been used on the following vehicles:

1981:

- 50 State Passenger Car
  2.3L (L4)
  4.2L (V8)
  5.0L (V8)
  5.8L (V8)
- California only
  4.9L (L6)

1982:

- 50 State Passenger Car
  3.8L (V6) added
  All 1981 are carried over to 1982

1983:

- 50 State Passenger Car
  2.3L (L4)
  5.8L (V8) (Police only)
- 50 State and Canada Truck
  2.0L (L4)
  2.3L (L4)
  4.9L (L6) F100
  4.9L (L6) California (under 8500 gvw)
- Canada Passenger Car
  5.8L (V8)

1984:

- 50 State Passenger Car
  5.8L (V8) High output
- Canada Passenger Car
  5.8L (V8)
- 50 State and Canada Truck
  2.0L (L4)
  2.3L (L4)

1985:

- 50 State and Canada Passenger Car
  5.8L (V8) (50 state police only)

1986:

- 50 State Police/ Canada Trailer Tow
  5.8L (V8)

The MCU system remains basically the same for all vehicles, car or truck. Minor variations apply to each engine. Maximum fuel economy and driveability, plus acceptable exhaust emissions are obtained through the use of engine input sensors and MCU-controlled output devices. There are three basic operating modes in the MCU system:

- Initialization
- Open loop
- Closed loop

The MCU system controls the engine air/fuel ratio according to various input information. One of the key input sensors is the exhaust gas oxygen (EGO) sensor. The EGO sensor monitors exhaust gas oxygen content and relays this to the MCU system through a small voltage input. When the MCU system CONTROLS the air/fuel mixture according to the EGO sensor the system is considered to be in CLOSED LOOP (Fig. 1). When certain engine operating conditions will not benefit from closed loop (wide-open throttle, cold engine operation, etc.) the MCU system IGNORES the EGO input (OPEN LOOP) and operates with predetermined fuel control according to other sensor inputs (Fig. 2).

FORD MICROPROCESSOR CONTROL UNIT (MCU)

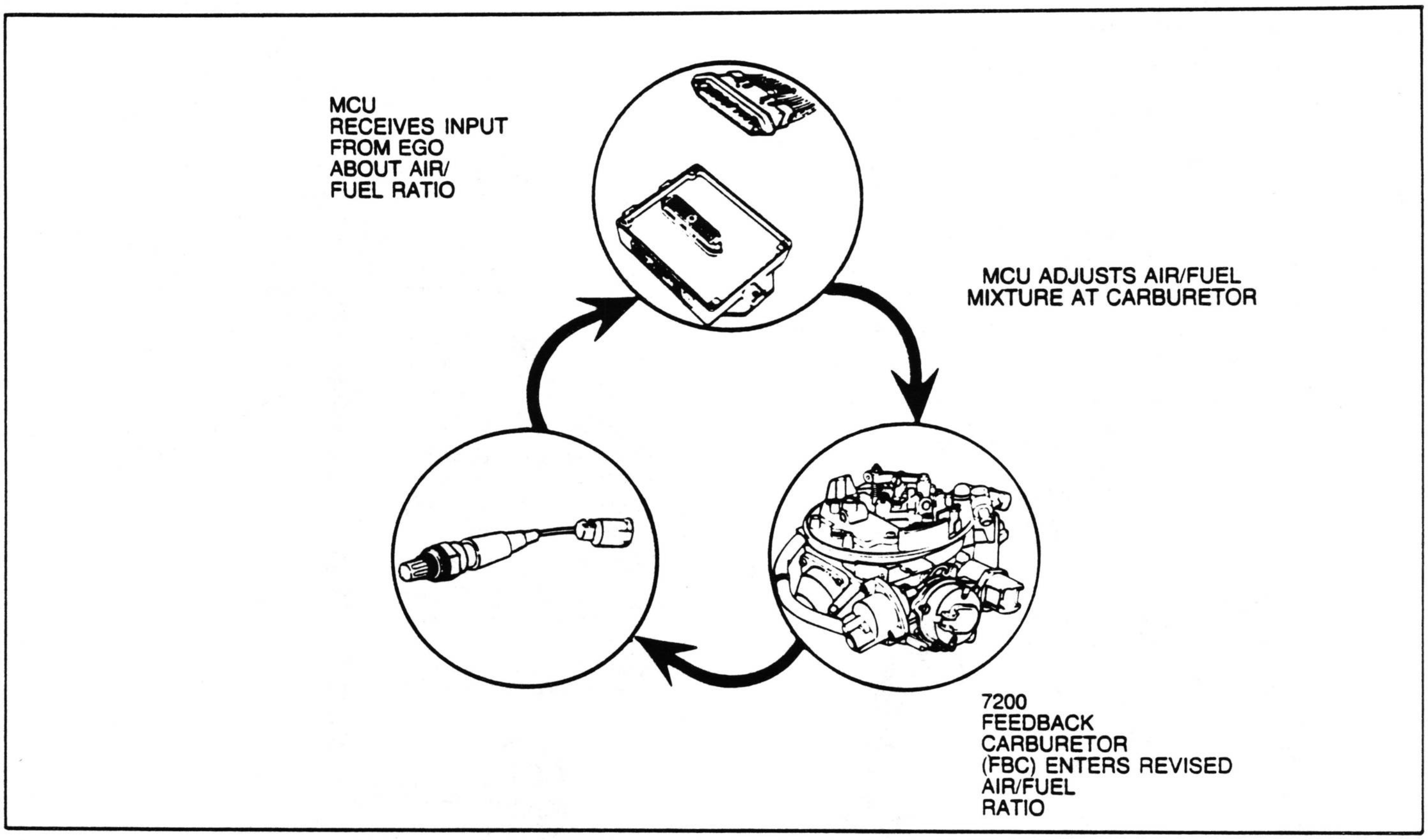


Figure 1. Closed Loop Operation

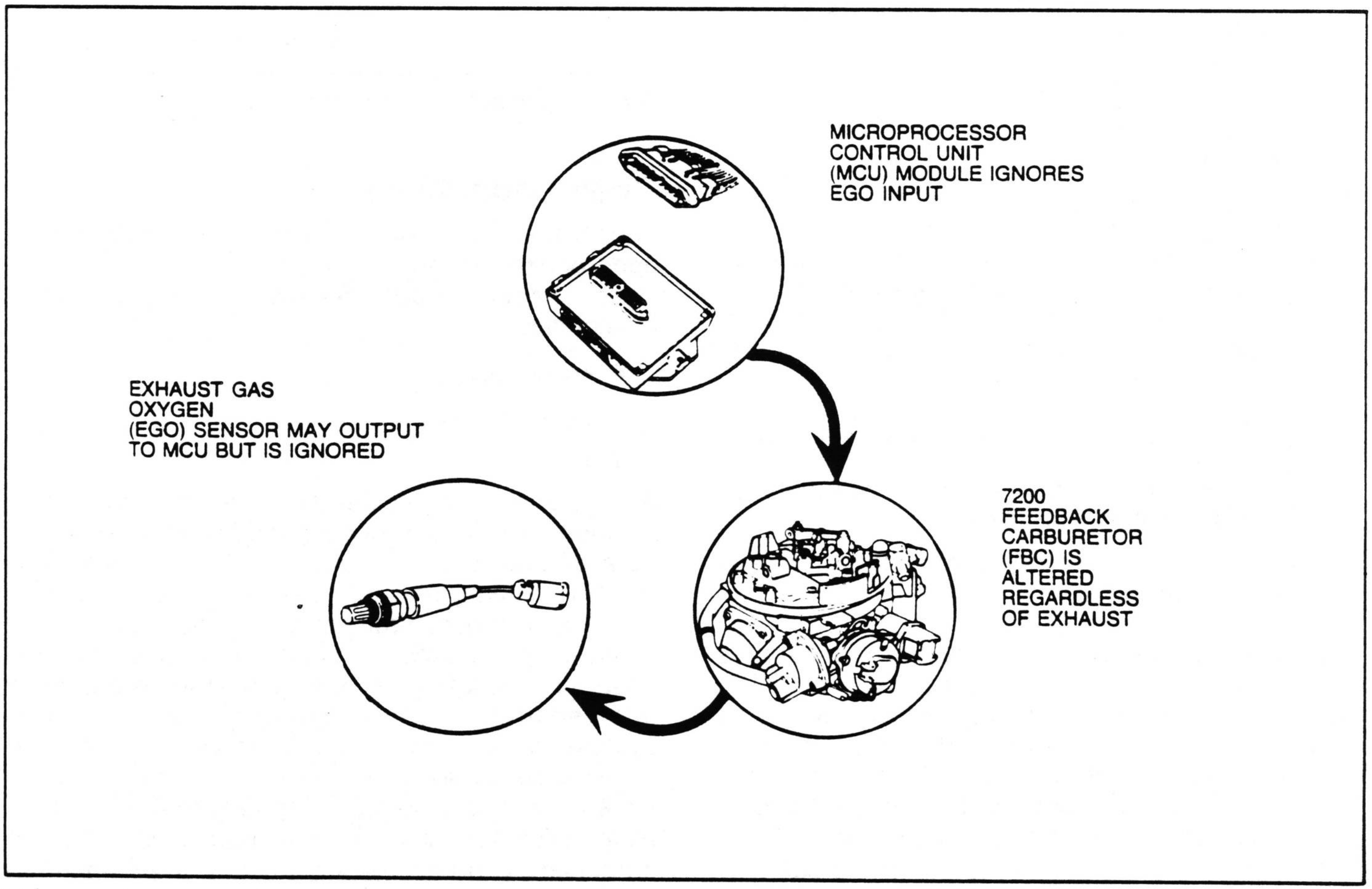


Figure 2. Open Loop Operation

FORD MICROPROCESSOR CONTROL UNIT (MCU)

Initialization Mode

The initialization mode occurs when the MCU system is activated by turning on the ignition and for a brief moment after the engine is started. During this initialization mode, the MCU is programmed to maintain a rich air/fuel ratio for easy starting. Because this mode is so brief, Thermactor air does not have time to function with the MCU system. But once the MCU system switches from the initialization mode to either the closed loop mode or open loop mode, Thermactor air comes in (Fig. 3).

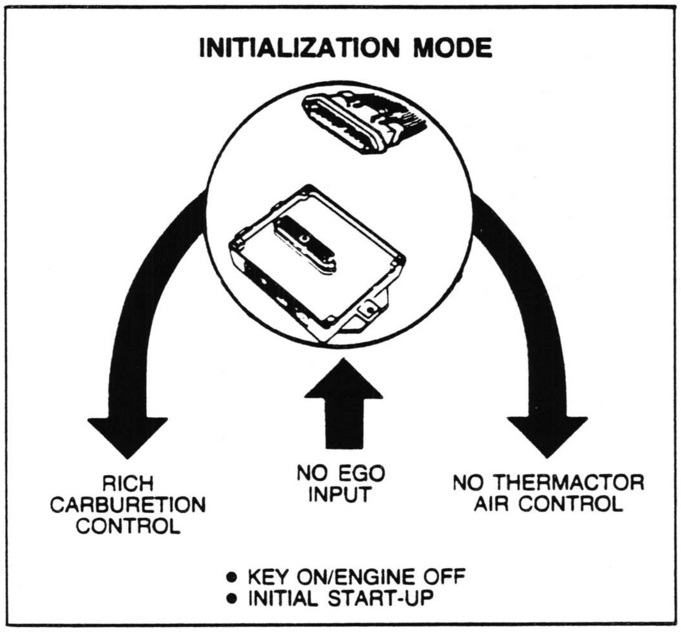


Figure 3. Initialization Mode

Closed Loop Mode

In the closed loop mode the MCU system balances out the air/fuel ratio to its approximate ideal value of 14.7 to 1. At this time, sufficient air is present in the air/fuel mixture to complete the combustion of all the hydrogen and carbon in the fuel.

The MCU system is in the closed loop mode when:

- The engine is running at its normal (warmed-up) operating temperature range.
- The engine is running under light load, part throttle conditions.

To maintain the critical ratio, the system monitors the exhaust gas using the exhaust gas oxygen (EGO) sensor to determine the actual air/fuel ratio being delivered by the carburetor, and signals the carburetor to lean-out or enrich the mixture accordingly. This is the **feedback carburetion.** Figure 4 shows closed loop mode operation. During this mode, Thermactor air is injected (downstream) into the catalytic converter.

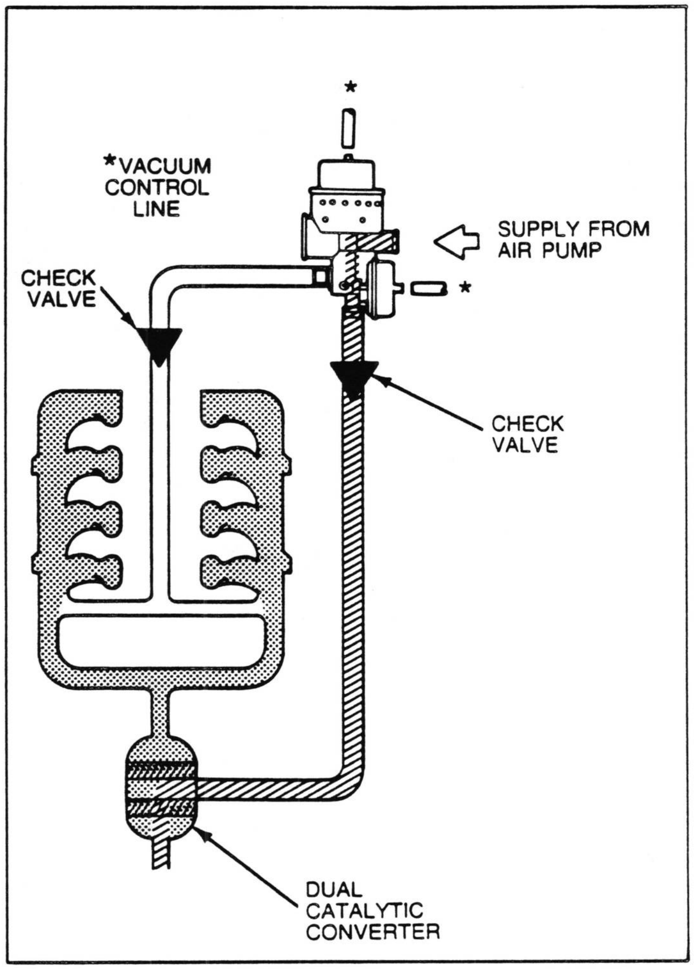


Figure 4. Closed Loop Thermactor Air

Open Loop Mode

The MCU system's air/fuel control function during the open loop mode can be best understood by looking at its performance under three different engine operating conditions:

- Acceleration
- Deceleration
- Idle

As the engine is accelerated, the MCU system is functioning in the open loop mode (Figs. 4 and 5). The throttle is rotating from part throttle to a wide-open throttle position, and the air/fuel control is running rich. The air/fuel control, adjusted to a proper mixture at this time by the MCU system, is held at a fixed level (just rich enough to ensure good engine response and performance). Also, on acceleration the MCU system momentarily diverts Thermactor air from the catalytic converter to be injected (upstream) into the exhaust manifold (Fig. 5). The diverted Thermactor air then starts burning the rich exhaust gases that are produced by the acceleration before they reach the catalytic converter.

FORD MICROPROCESSOR CONTROL UNIT (MCU)

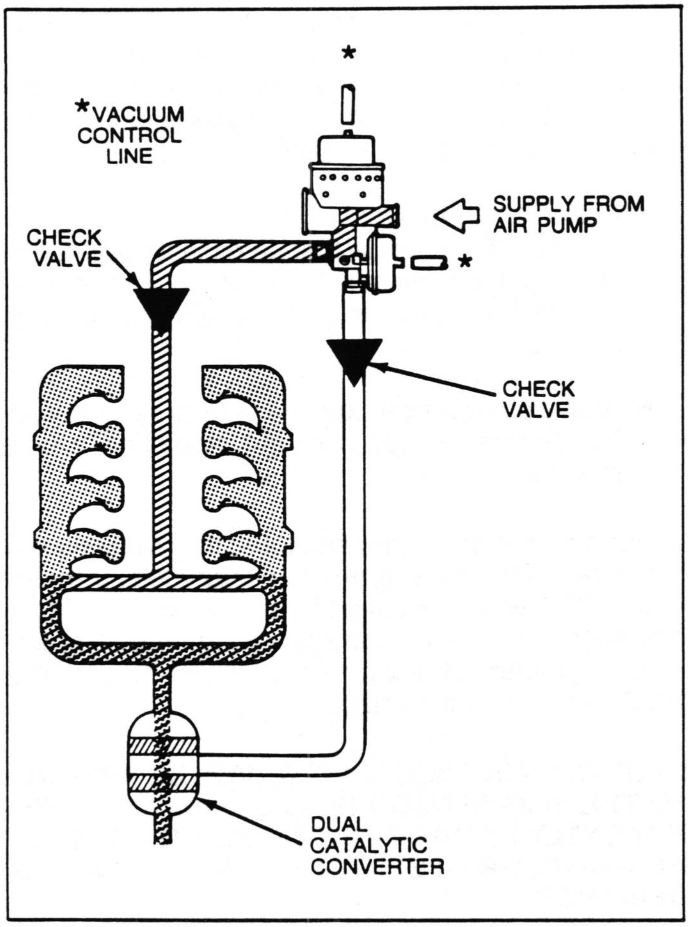


Figure 5. Open Loop Thermactor Air

When the engine is operating under a prolonged deceleration or uninterrupted idle, the MCU system is functioning in the open loop mode as the throttle rotates to a closed throttle position, and the air/fuel control runs either rich or lean, depending on the engine's calibration.

Drive Demand Compensation

Various vacuum switches within the MCU system inform the MCU module of the particular drive demand under which the engine is operating. In this way, the MCU module can establish a proper balance between satisfactory engine performance and good vehicle emissions by altering the feedback carburetion system, Thermactor air system and catalytic system, for particular drive demands.

There are several drive demands (different operating conditions) placed on an engine during operation. The most common drive demands are closed throttle, wide-open throttle, crowd, and cruise.

Any operating condition can cause a different set of circumstances. Different controls are used to achieve the goal of driveability and fuel economy (Fig. 6).

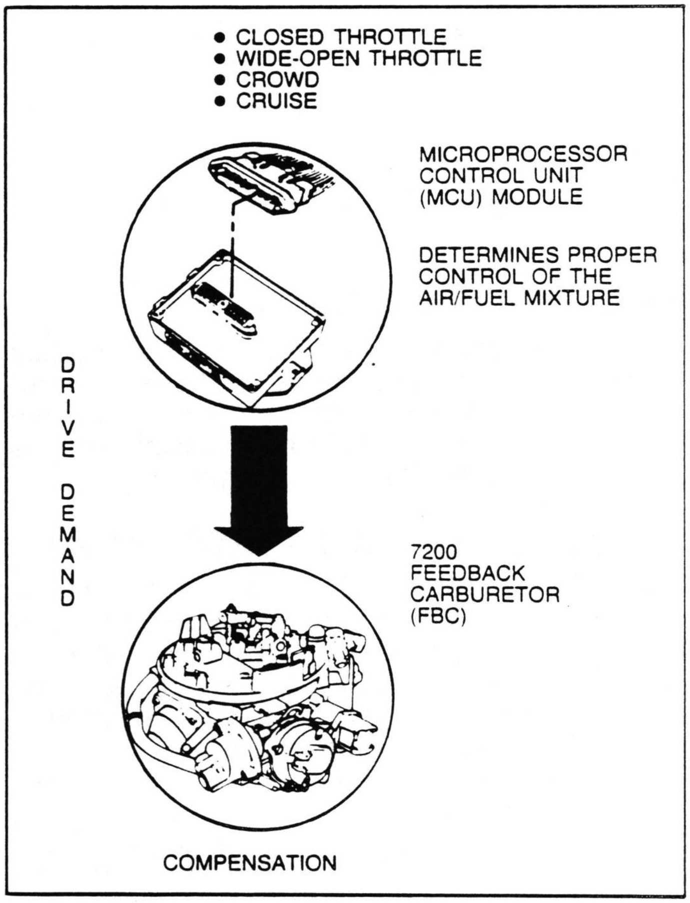

• CLOSED THROTTLE
• WIDE-OPEN THROTTLE
• CROWD
• CRUISE
MICROPROCESSOR CONTROL UNIT (MCU) MODULE
DETERMINES PROPER CONTROL OF THE AIR/FUEL MIXTURE
DRIVE DEMAND
7200 FEEDBACK CARBURETOR (FBC)
COMPENSATION

Figure 6. Drive Demand Compensation

MCU SYSTEM COMPONENTS

Microprocessor Control Unit (MCU)

The center of the MCU system is the MCU module. It receives informative electrical input signals from several input MCU devices that monitor the engine's operation at all times. It then processes the input signal information by looking for any unbalanced conditions that may exist between the vehicle's feedback carburetion system, Thermactor air system, and catalytic system. When unbalanced conditions warrant, the MCU module sends output signals to various MCU devices, so they can adjust, regulate, or maintain a balanced MCU system operation, in accordance with the engine's drive demands and operating conditions (Fig. 7).

FORD MICROPROCESSOR CONTROL UNIT (MCU)

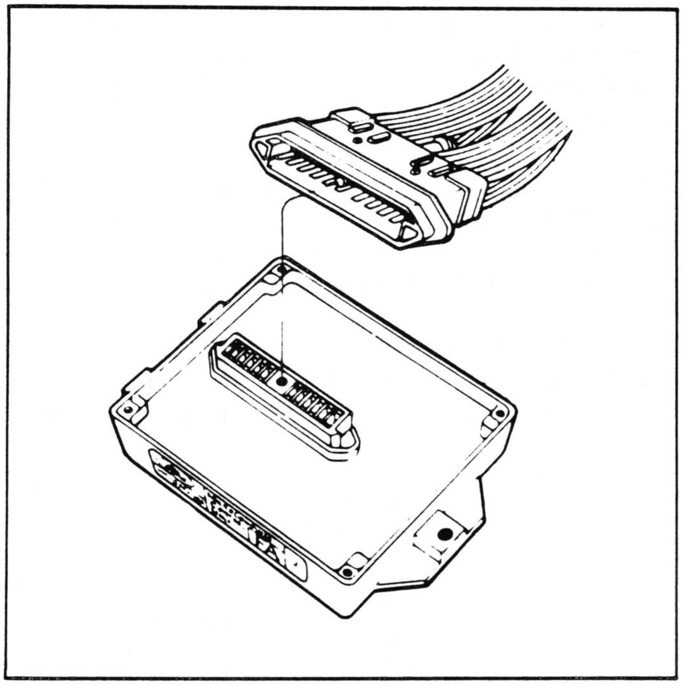


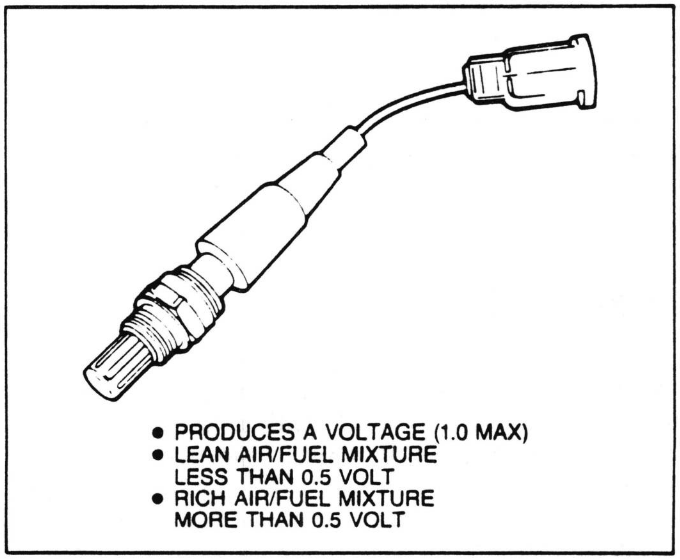
Figure 7. MCU Module

MCU Input Components

The MCU system relies on various inputs to evaluate certain engine operating conditions. These inputs are either electrical response signals or mechanical/electrical signals. The following material describes these inputs as they relate to the MCU system.

Exhaust Gas Oxygen (EGO) Sensor

The EGO sensor (Fig. 8) is used on all MCU system engines. The air/fuel ratio at the carburetor is balanced by an electrical signal sent from the EGO sensor to the MCU module. The EGO sensor is located in the engine's exhaust manifold, exposed to the engine's stream of exhaust gas.



• PRODUCES A VOLTAGE (1.0 MAX)
• LEAN AIR/FUEL MIXTURE LESS THAN 0.5 VOLT
• RICH AIR/FUEL MIXTURE MORE THAN 0.5 VOLT

Figure 8. EGO Sensor

The electrical signal forwarded from the EGO sensor to the module generally varies on either side of one-half (0.5) of a volt while the engine is operating in the closed loop mode. In the open loop mode, the voltage may average between 0-1 volt.

- Below 0.5 input voltage, the EGO sensor notifies the MCU module that an excessive amount of oxygen content is in the exhaust gas because the carburetor is supplying a lean air/fuel mixture.
- Above 0.5 input voltage, the sensor indicates an insufficient oxygen content, signifying a rich mixture.

As indicated, the voltage range and its variations are very small. Therefore, when a voltage measurement of the EGO sensor is called for during any MCU test procedures, it must be done with a high-input impedance voltmeter (at least 10 megohms) so that the EGO sensor is not damaged.

CAUTION: VOLTAGE MUST NEVER BE APPLIED TO THE EGO SENSOR BECAUSE IT WILL PERMANENTLY DAMAGE THE SENSOR OR RESULT IN INACCURATE DIRECT RESISTANCE READINGS.

Engine Coolant Temperature Switches

The coolant temperature-controlled vacuum switches sense the engine's coolant temperature and send electrical input signals to the MCU module, indicating whether or not the engine is at normal operating temperature. The switches used on MCU system engines perform the same function on each engine but differ slightly in the method used.

Low-Temperature Switch — 2.3L (140 CID) Engine

The 2.3L application uses an electrical switch which is part of a temperature-controlled ported vacuum switch (3-port PVS) in the EGR control system.

The switch (Fig. 9) senses only the low range of coolant temperature and closes at or above 95°F.

When the switch closes, it grounds the low-temperature circuit to the MCU module to make the required air/fuel mixture adjustment as the engine moves from cold engine operation to normal engine temperature operation.

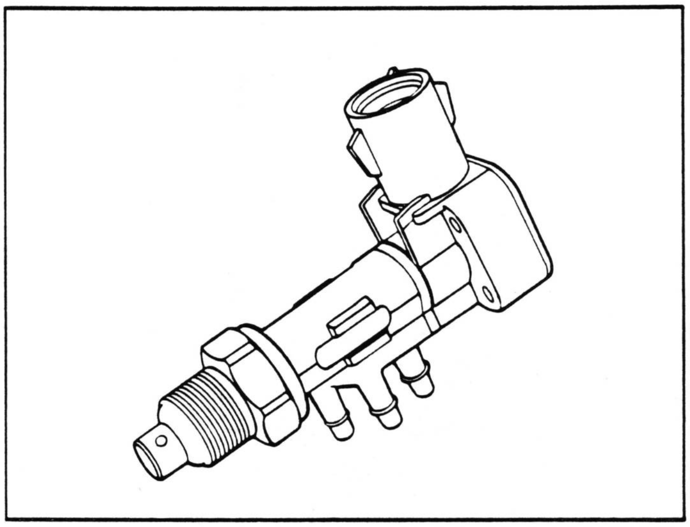


Figure 9. Low-Temperature Switch

Coolant Low-Temperature Switch — 4.9L (300 CID) Engine

On 4.9L California engines, the low-temperature switch (Fig. 10) is operated by vacuum but it is not part of the ported vacuum switch (PVS). The switch is one in a bank of four vacuum switches that are remotely mounted at the rear of the engine compartment but used in conjunction with a separate ported vacuum switch.

- At or above 95°F coolant temperature, the ported vacuum switch (PVS) cuts off vacuum to the vacuum-operated, low-temperature switch.
- With no vacuum, the low-temperature switch closes and the circuit to the MCU module is grounded, which signals the module to change the air/fuel mixture from cold engine operating to normal engine temperature operation.

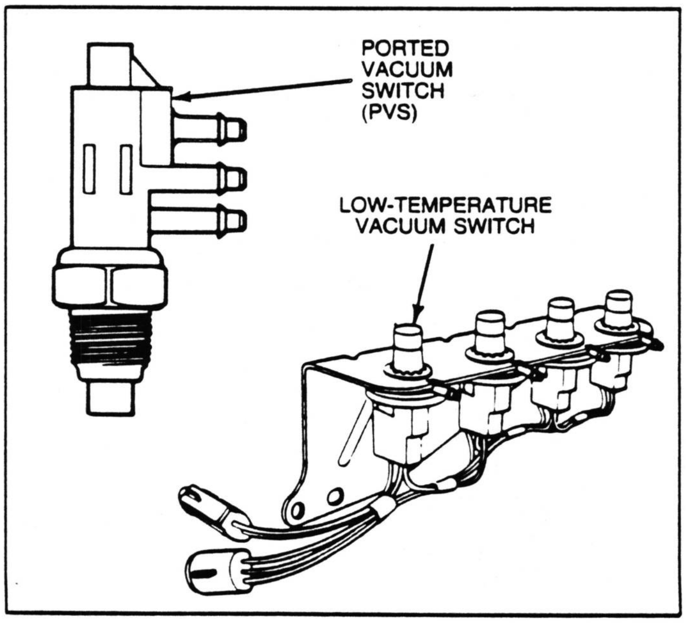


Figure 10. Coolant Low-Temperature Switch

Mid/Dual-Temperature Switches — V6 and V8 Engines

Two temperature switches (Fig. 11) are used on V6 and V8 engines equipped with the MCU system. Both switches are electrical and send electrical input signals to the MCU module which cover a wide range of engine coolant temperatures.

- The mid-temperature switch is part of a ported vacuum switch (PVS) that closes at or above 128°F to ground the circuit and signal the MCU module.
- The dual-temperature switch is an electrical switch that senses both low-temperature and overheating conditions, closing between 55°F and 235°F to signal the MCU module.

In response to the various input signals received from the switches, the MCU module reacts accordingly to compensate for the various engine operating conditions. These may include changing the air/fuel ratio, spark retard, throttle position, Thermactor air control, and canister purge.

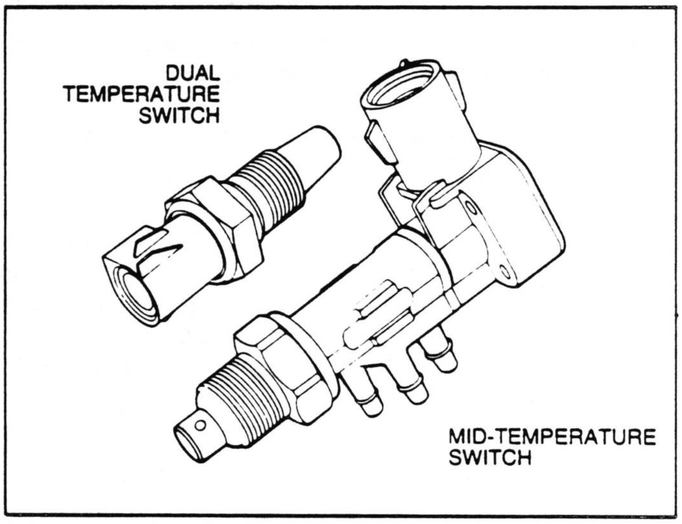


Figure 11. Mid/Dual-Temperature Switches

Tach Input Signal

When the MCU module sends an output signal to the air/fuel control device to change the carburetor's air/fuel ratio, a smooth transition to the revised air/fuel ratio must take place. Any over-correction or sudden changes in the air/fuel ratio must be avoided.

- A smooth change in the air/fuel ratio is accomplished by an engine rpm signal, a ground pulse known as a TACH input signal, from the ignition coil's primary circuit.
- The frequency of the TACH input signal to the MCU module is proportional to the engine's speed, and governs the damping of the air/fuel output signal from the module.

FORD MICROPROCESSOR CONTROL UNIT (MCU)

All MCU vehicles utilize the TACH input signal to control any air/fuel ratio changes.

Knock Sensor

A knock sensor (Fig. 12) is included on some V6 and V8 calibrations. It is a tuned-crystal pickup, selectively responsive to spark knock caused by an over-advanced ignition timing due to a poor fuel octane rating or elevation level (altitude) changes. Primarily, the knock sensor operates in the closed loop mode (cruise condition) and allows the engine to maintain a maximum ignition efficiency.

- When a spark knock occurs, the MCU module receives a pulsing electrical signal output from the knock sensor so the module can compensate for the over-advanced ignition timing by retarding it.
- Before beginning any MCU test procedures on V6 or V8 vehicles, check whether or not the vehicle has a knock sensor. Special test procedures are required for those vehicles.

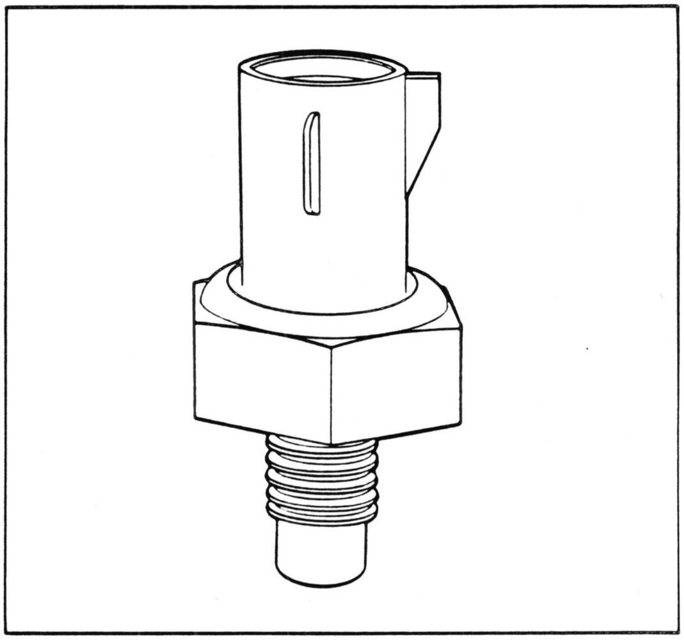


Figure 12. Knock Sensor

DRIVE DEMAND DEVICES

The following MCU component inputs are affected by the load characteristics of the engine.

Idle Tracking Switch — 2.3L (140 CID) Engine

On 2.3L vehicles, a closed throttle condition such as an uninterrupted idle or prolonged deceleration is detected by the idle tracking switch (Fig. 13). It is a mechanically operated electrical switch mounted near the throttle linkage (e.g., Holley 6500 carburetor).

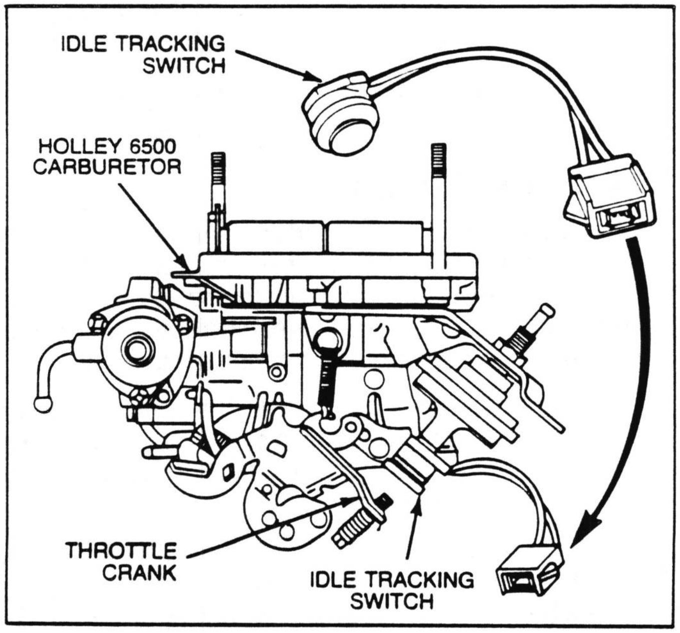


Figure 13. Idle Tracking Switch

The idle tracking switch is a normally closed switch which is opened at closed throttle. This occurs when the throttle linkage on the carburetor rotates into a closed throttle position, contacting and holding the switch open.

When the idle tracking switch is open, the circuit from the switch to the MCU module is broken. The MCU module enters a closed throttle mode, which means it has to change the vehicle's carburetion and Thermactor air to meet the engine's closed throttle requirements (Fig. 14).

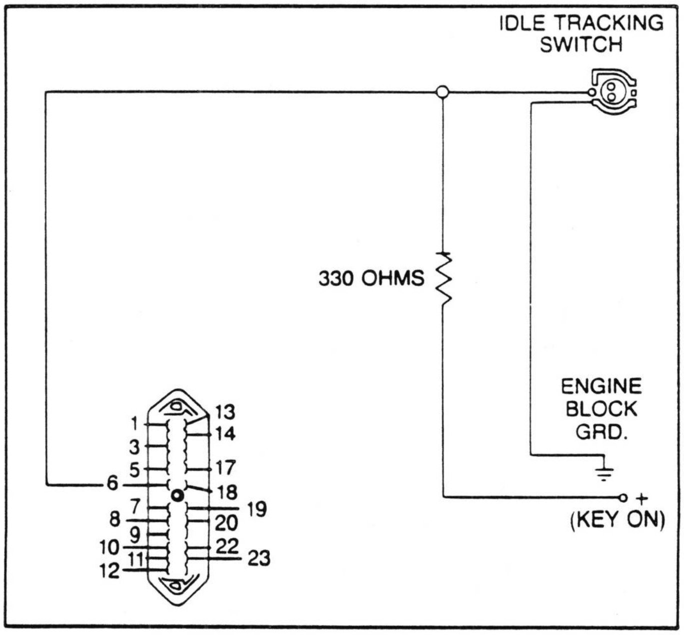


Figure 14. Idle Tracking Schematic

FORD MICROPROCESSOR CONTROL UNIT (MCU)

Wide-Open Throttle (WOT) Vacuum Switch — 2.3L (140 CID) Engine

The wide-open throttle requirements for 2.3L engines are sensed by a normally closed vacuum switch (Fig. 15) which is actuated by manifold vacuum. The switch is also used for cold-start fuel control by routing manifold vacuum through the temperature-sensing vacuum valve in the air cleaner.

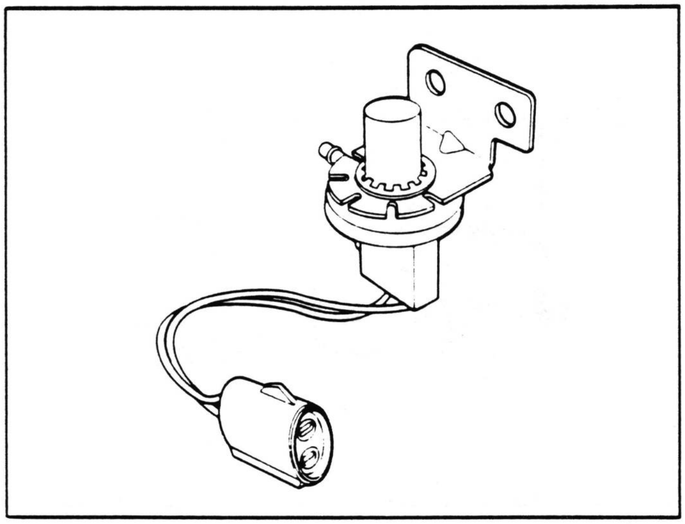


Figure 15. WOT Vacuum Switch

When the engine is warmed up at idle, the temperature-sensing vacuum valve opens to allow vacuum to enter the WOT switch and keep it open. It closes as the throttle begins to open and manifold vacuum falls off below the set point of the WOT switch.

A closed WOT switch signals the MCU module to adjust for the engine's wide-open throttle. The set point for closing the switch varies with transmission applications:

— Three inches of vacuum (Hg) for automatic
— Five inches of vacuum (Hg) for manual

Vacuum Switch Assembly — 4.9L (300 CID) California Engine

Four vacuum switches sense wide-open throttle, crowd, closed throttle, and low-temperature conditions on the 4.9L (300 CID) California engine. The switches (Fig. 16) send these input signals to the MCU module to regulate the air/fuel mixture and Thermactor air.

The switches are opened by vacuum during the vehicle's closed loop mode and closed when the vacuum falls below the set point of each switch.

— The wide-open, crowd, and low-temperature switches are connected to the intake manifold vacuum fitting.

— The closed throttle vacuum switch is connected to the third-port vacuum on the carburetor.

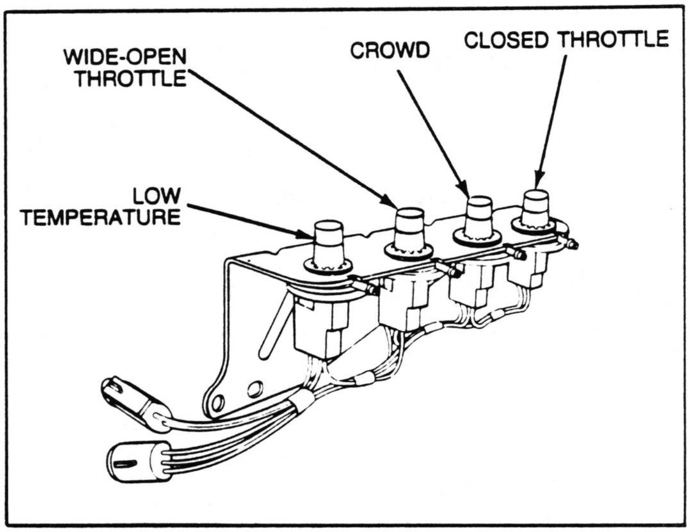


Figure 16. 4.9L Vacuum Switch Assembly

The switches are mounted, as an assembly, at the rear of the engine compartment.

Zoned Vacuum Switch Assembly — V6 and V8 Engines

Three zoned vacuum switches (Fig. 17) are used to sense throttle position under various engine load conditions. This information, in the form of electrical input signals, is sent to the MCU module to adjust engine operation per throttle requirements.

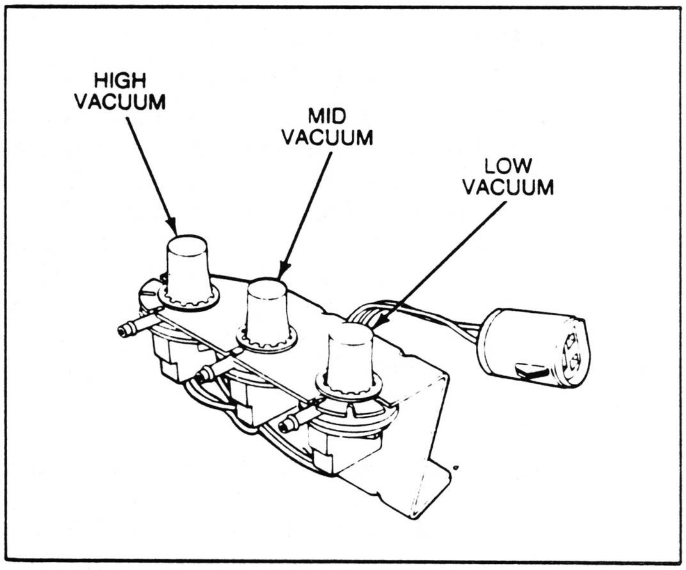


Figure 17. Zoned Vacuum Switch Assembly

— The high and low (HI/LO) vacuum switches are electrically connected in parallel and their circuits are grounded when the engine is under a high-vacuum condition (closed throttle) or low-vacuum condition (wide-open throttle).

- The middle or mid-vacuum (MIDVAC) switch closes under medium-to-high manifold vacuum during a cruise condition (part throttle).
- The MIDVAC switch opens when manifold vacuum falls below the set point of the switch at wide-open throttle or crowd conditions.

Ignition Barometric Pressure Switch

Altitude compensation is necessary for proper air/fuel mixture control and ignition timing advance. The barometric sensor supplies the altitude information for proper MCU operation. The barometric sensor is used on 5.8L applications.

MCU OUTPUT COMPONENTS

During engine operation the MCU inputs constantly supply information. The MCU module controls various output functions to maintain proper engine performance, fuel economy and emissions (Fig. 18).

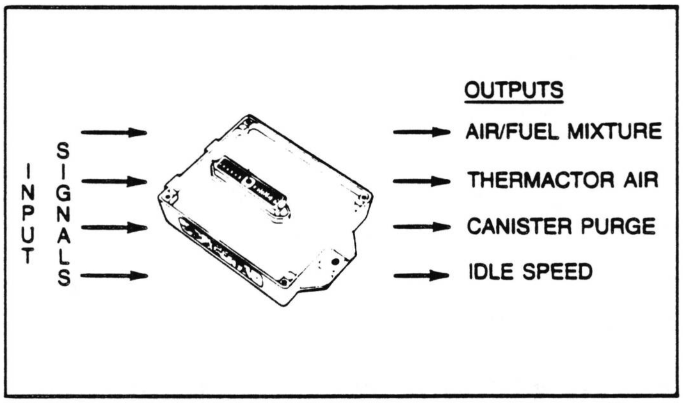


Figure 18. MCU Output Control

Air/Fuel Control Devices

The MCU module, through an output signal, controls the air/fuel mixture according to the EGO input, vacuum load, and various other engine monitor systems.

Fuel Control Solenoids (FCS) — 2.3L (140 CID) and 4.9L (300 CID) Engines

The mechanical event controlling the air/fuel mixture varies slightly from one engine type to the other, but a similarity does exist between the 2.3L and 4.9L engines: both engines use a fuel control solenoid (FCS) to regulate the air/fuel mixture. The on-off duty cycle of the fuel control solenoid responds to the MCU module's output signal, a voltage pulse of ten cycles per second. The voltage pulsation, averaging in value near 10 volts, causes the FCS to lean or enrich the air/fuel mixture at the carburetor.

The FCS for the 2.3L engine is mounted in the right rear corner of the engine compartment, as viewed from the driver's seat. Incorporated into the FCS is a vacuum regulator that passes a feedback vacuum, calibrated between 0 inches Hg (full rich) and 5 inches Hg (full lean), to an air/fuel mixture control diagram located on the model 6500 feedback carburetor (Fig. 19).

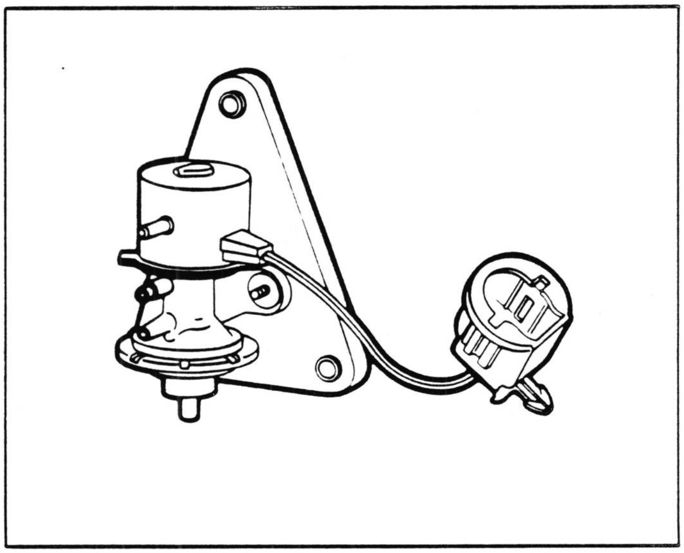


Figure 19. Remote Mounted Fuel Control Solenoid

On the 4.9L engine, the fuel control solenoid is mounted directly on the YFA carburetor and does not use a vacuum regulator to aid it in controlling the carburetor's air/fuel mixture. The pulsed air/fuel signal is applied to a fuel control solenoid. A 100% duty cycle (10 volts continuous) causes a lean mixture. Zero percent duty cycle (0 volts) causes a rich mixture (Fig. 20).

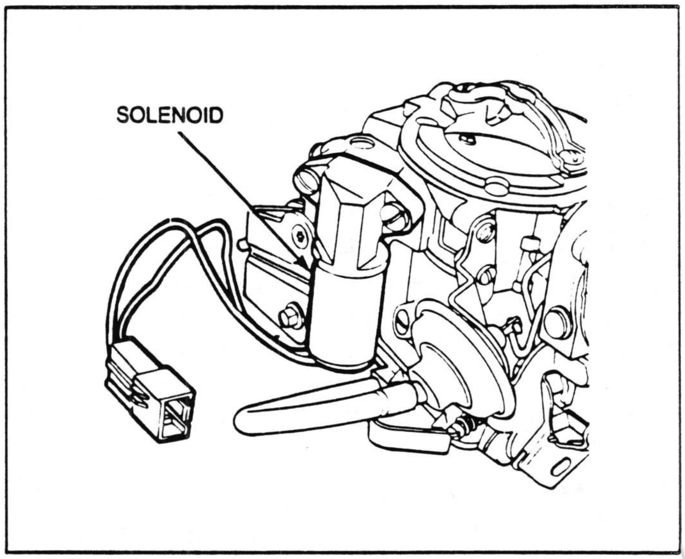


Figure 20. Carburetor Mounted Fuel Control Solenoid

FORD MICROPROCESSOR CONTROL UNIT (MCU)

Feedback Control Motor — V6 and V8 Engines

The air/fuel mixture regulation for the 3.8L V6 engine and the 4.2L, 5.0L and 5.8L V8 engines is achieved by a feedback carburetor.

The feedback control system for the model 7200 carburetor utilizes a back-suction metering valve positioned by a feedback control motor (Fig. 21). The motor is controlled by the microprocessor control unit (MCU) and varies the position (opening) of the metering valve in response to oxygen measurements by the EGO sensor located in the exhaust system. A rich air/fuel mixture from the carburetor will result in a signal from the MCU to the feedback control motor to open the metering valve, which exposes more of the control vacuum to the fuel bowl (Fig. 22). This increased bowl depression will lean out the air/fuel mixture.

NOTE: *On some calibrations an idle bleed system is used rather than a back-suction system.*

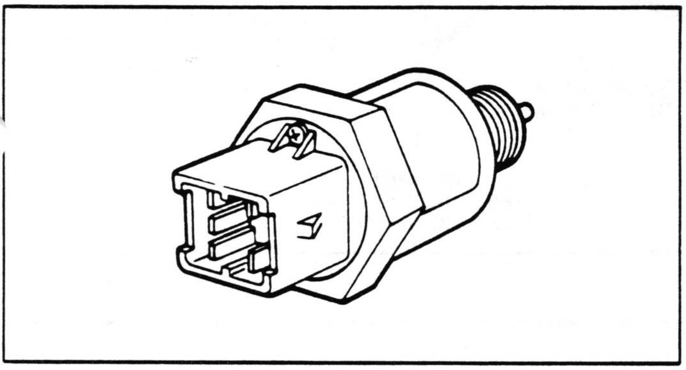


Figure 21. Feedback Control Motor

Thermactor Air Control Devices

Distribution and regulation of Thermactor air is an important function of the MCU system. The two-stage catalytic converter cannot operate effectively when exhaust gas is overrich in carbon monoxide (CO) and unburned hydrocarbons (HC).

In normal operation, extra air is required to be injected into the mid-section of the catalytic converter, so that complete combustion of the exhaust gas from the first stage will take place in the second stage.

During warm-up or other rich-mixture conditions, additional air is required in the exhaust manifold to burn the exhaust gas before it reaches the catalytic converter.

Under prolonged deceleration or idle conditions, Thermactor air must be bypassed (dumped) to atmosphere to prevent converter overheating.

Catalytic Converter

The MCU system's capacity for reducing vehicle emissions is due mainly to the use of a three-way catalytic converter (Fig. 23).

After the first stage of the catalytic converter receives the exhaust gases from the engine, it reduces the nitrogen oxides of the exhaust gas into separate elements of nitrogen and oxygen in the first stage, and completes the combustion of carbon monoxide and unburned gases in the second stage.

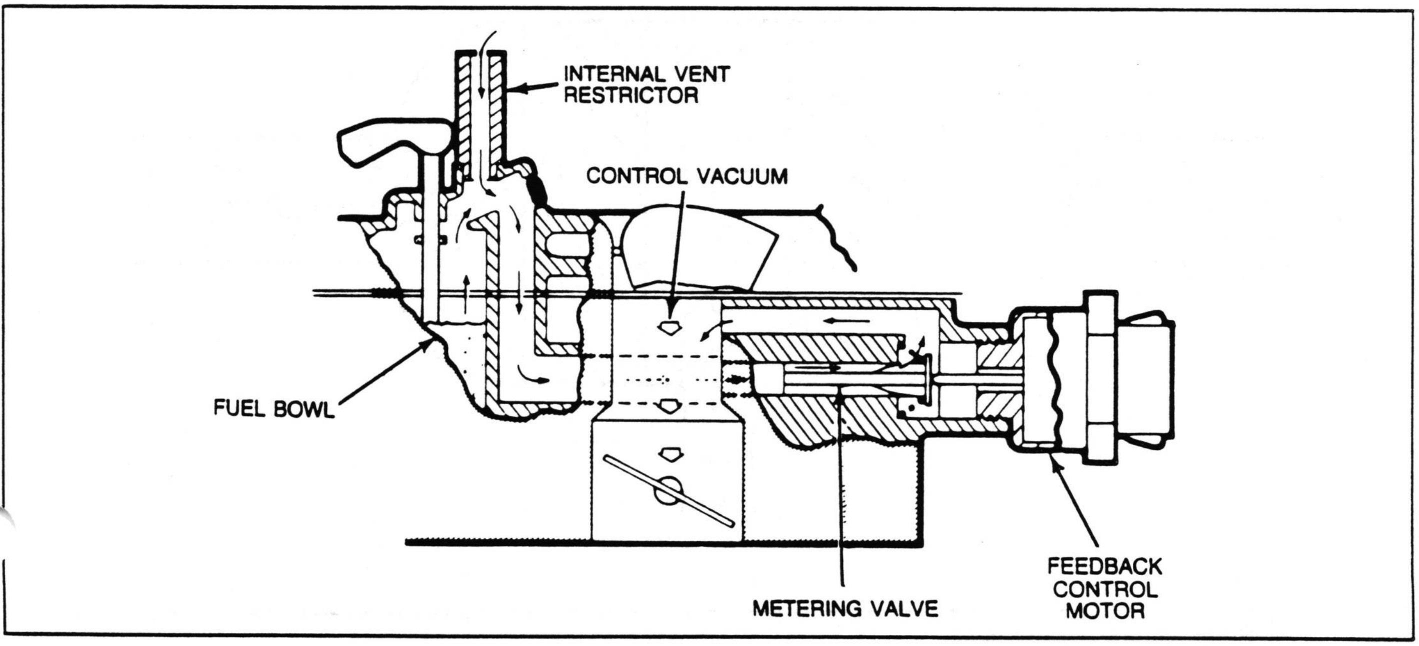


Figure 22. Feedback Control Motor Operation

Secondary air from the Thermactor air pump is injected into the catalytic converter's mixing chamber to aid in the converter's second-stage combustion. The distribution of the secondary air from the Thermactor air pump is an important function of the MCU system.

Another equally significant function of the MCU system, as previously stated, is to closely regulate the carburetor's air/fuel mixture, because the composition of exhaust gases leaving the engine to enter the two-stage catalytic converter must be within narrower limits than what was acceptable for the earlier converters (Fig. 24).

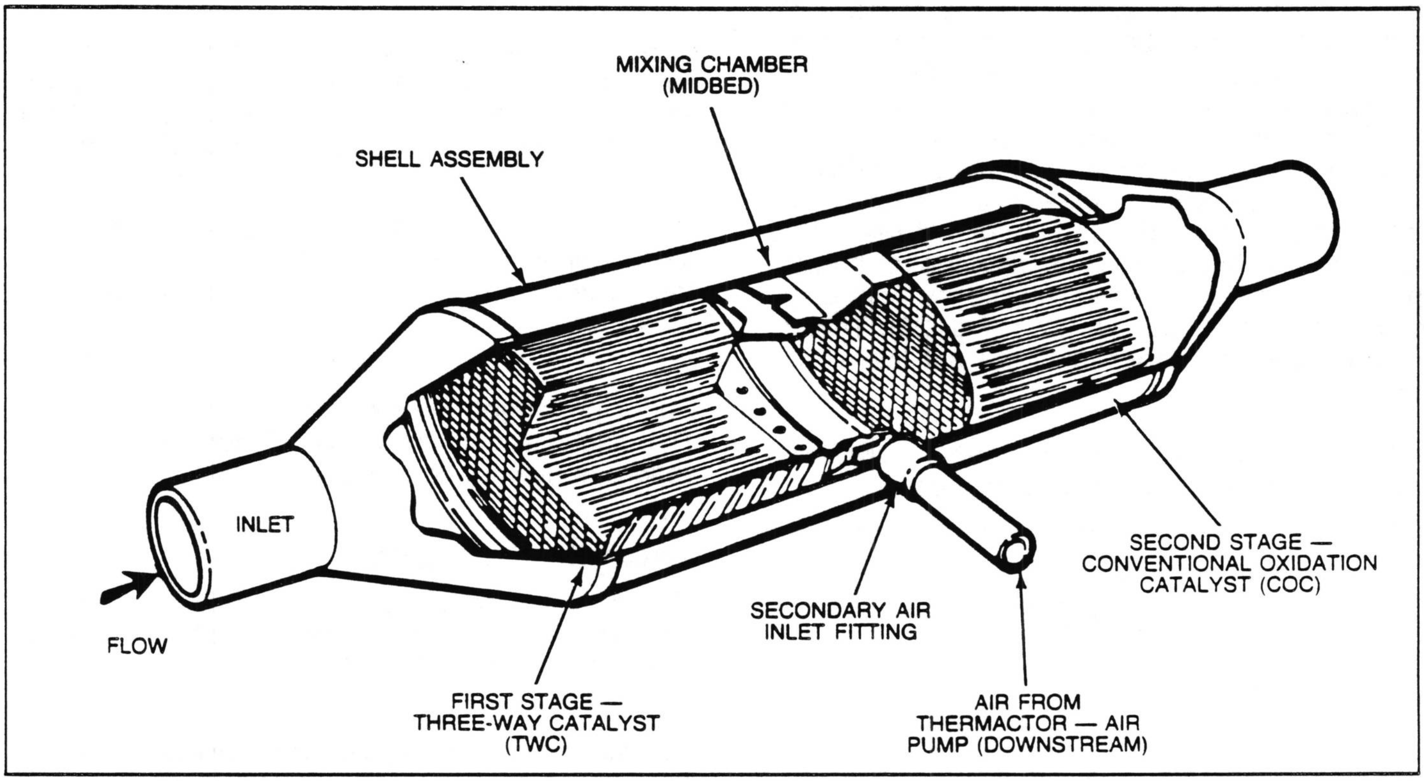

MIXING CHAMBER (MIDBED)
SHELL ASSEMBLY
INLET
FLOW
SECOND STAGE — CONVENTIONAL OXIDATION CATALYST (COC)
SECONDARY AIR INLET FITTING
FIRST STAGE — THREE-WAY CATALYST (TWC)
AIR FROM THERMACTOR — AIR PUMP (DOWNSTREAM)

Figure 23. Three-Way Catalyst

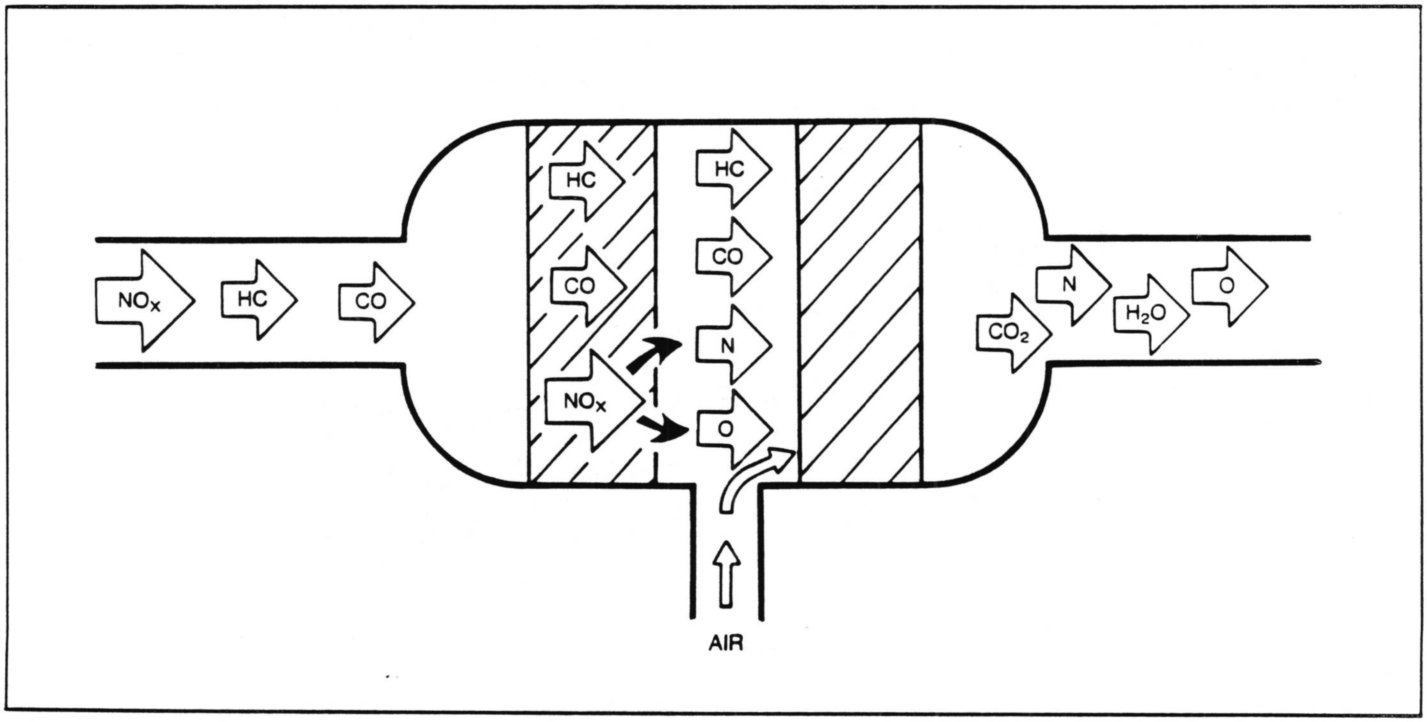


Figure 24. Two-Stage Catalyst Operation

FORD MICROPROCESSOR CONTROL UNIT (MCU)

Thermactor Air Control Valve

The Thermactor air control valve assembly consists of two vacuum-operated valves: the Thermactor air bypass (TAB) valve and the Thermactor air diverter (TAD) valve. Manifold vacuum is used to open the valve poppets in order to direct Thermactor air to the catalytic converter, exhaust manifold or atmosphere. Two separate valves are used on 1980 models — an air bypass valve and an air control valve. However, basic operation is the same.

Sectional views of the Thermactor air control valves are shown in Figures 25 and 26. The operation of the valves is very similar. The difference is in the location of the vacuum port for the air bypass control. The 2.3L valve also has a vacuum vent behind the air bypass control diaphragm.

Air Check Valve

The Thermactor system is protected from exhaust gas heat through the use of an air check valve (Fig. 27). The valve is mounted in line between the air control valve outlet port and the exhaust system. The one-way valve permits Thermactor air only to enter the exhaust system.

Thermactor Air Control Solenoids

The manifold vacuum used to open the valve poppets in the Thermactor air control valve is turned ON or OFF by electrical solenoids (Figs. 28, 29 and 30). The solenoids, in turn, are energized or de-energized by the MCU output voltages in either the open loop or closed loop mode. In accordance with their individual function, the solenoids are called TAB (for Thermactor air bypass control) or TAD (for Thermactor air diverter control).

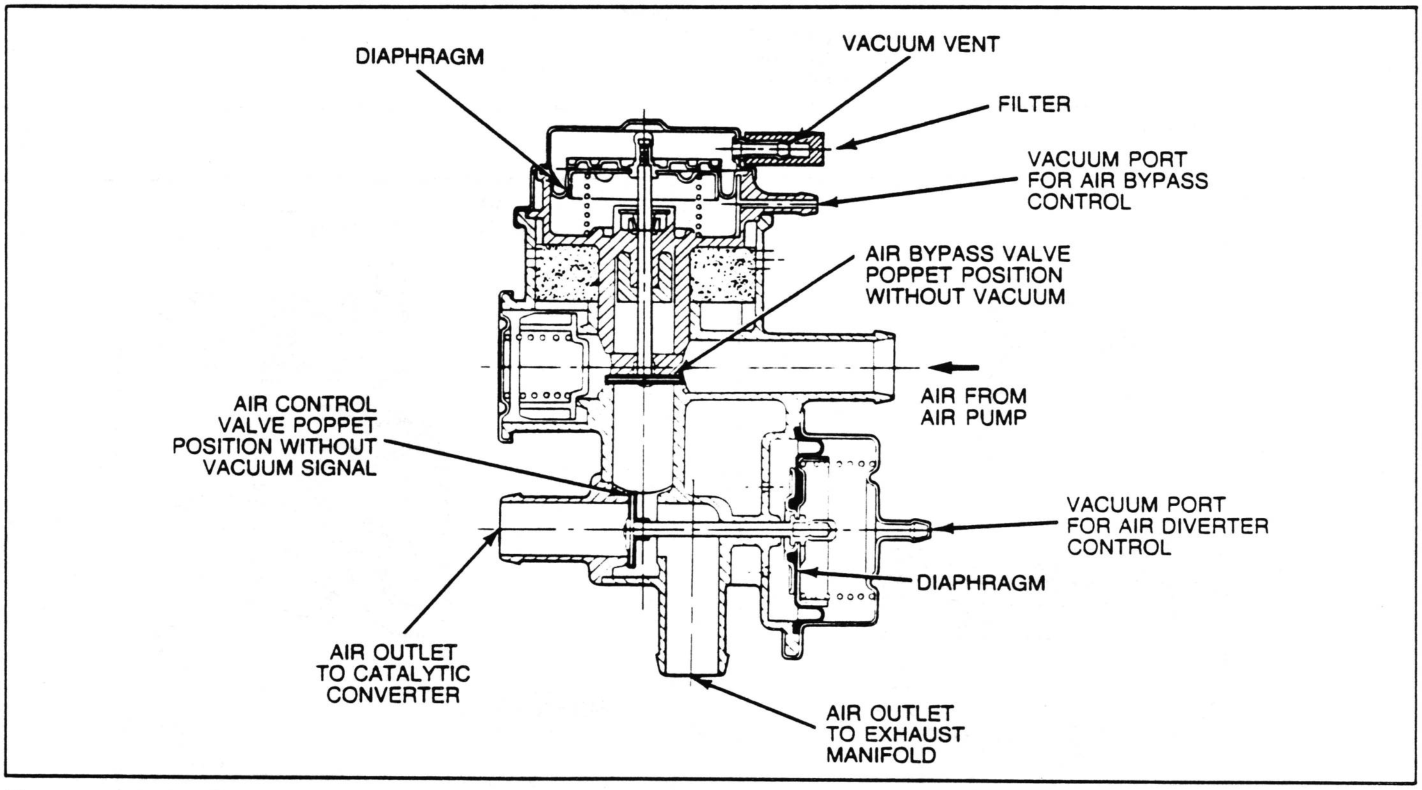

DIAPHRAGM
VACUUM VENT
FILTER
VACUUM PORT FOR AIR BYPASS CONTROL
AIR BYPASS VALVE POPPET POSITION WITHOUT VACUUM
AIR FROM AIR PUMP
AIR CONTROL VALVE POPPET POSITION WITHOUT VACUUM SIGNAL
VACUUM PORT FOR AIR DIVERTER CONTROL
DIAPHRAGM
AIR OUTLET TO CATALYTIC CONVERTER
AIR OUTLET TO EXHAUST MANIFOLD

Figure 25. 2.3L ACV

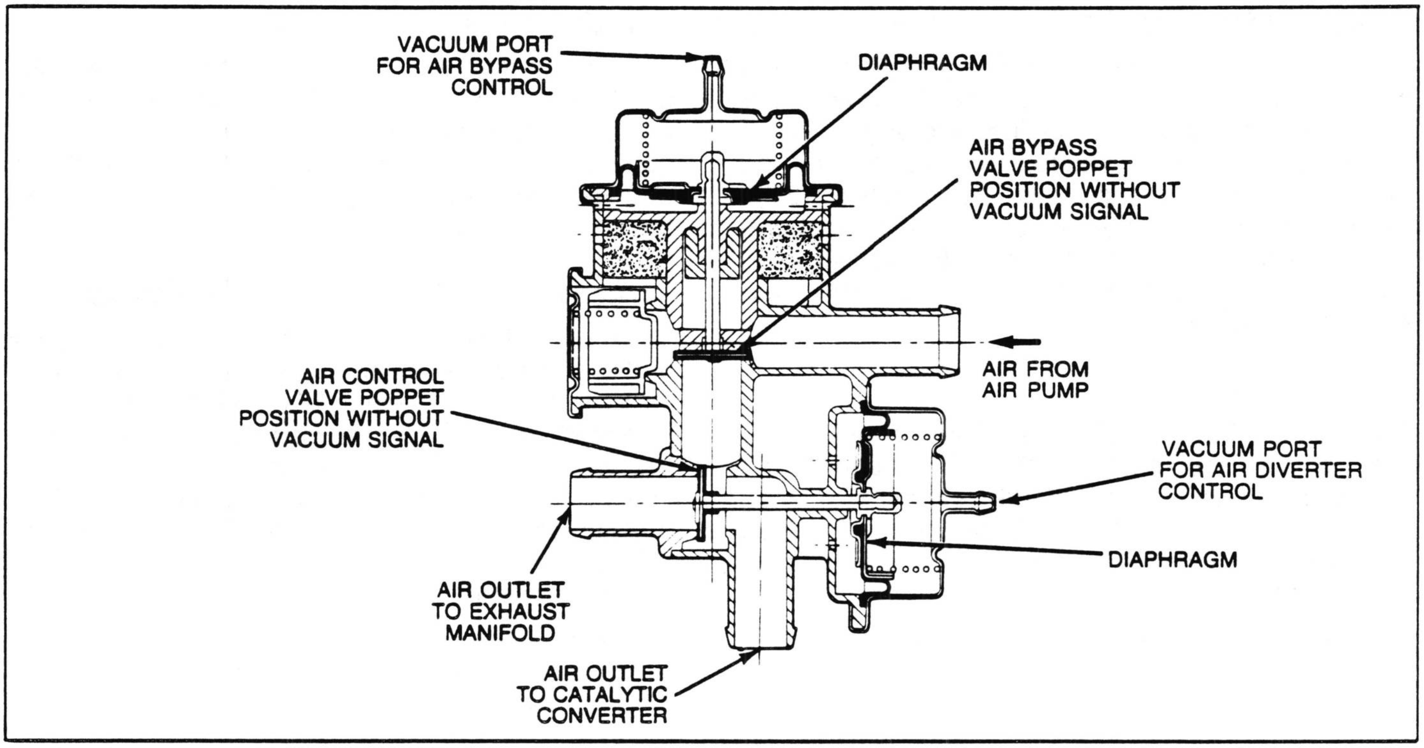

VACUUM PORT FOR AIR BYPASS CONTROL
DIAPHRAGM
AIR BYPASS VALVE POPPET POSITION WITHOUT VACUUM SIGNAL
AIR FROM AIR PUMP
AIR CONTROL VALVE POPPET POSITION WITHOUT VACUUM SIGNAL
VACUUM PORT FOR AIR DIVERTER CONTROL
DIAPHRAGM
AIR OUTLET TO EXHAUST MANIFOLD
AIR OUTLET TO CATALYTIC CONVERTER

Figure 26. ACV Except 2.3L

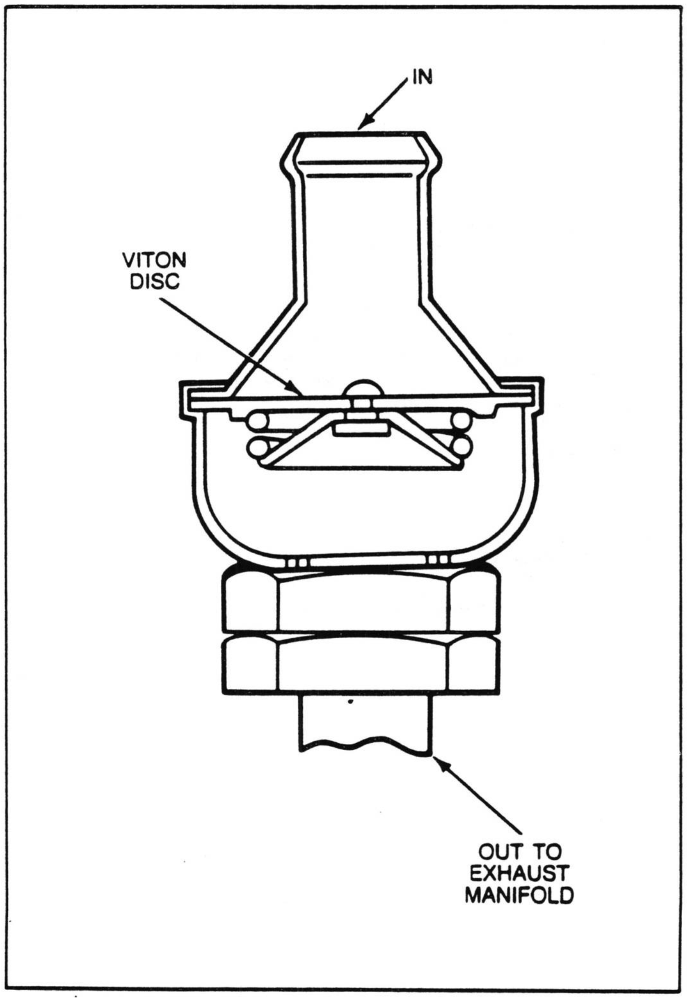


Figure 27. Air Check Valve

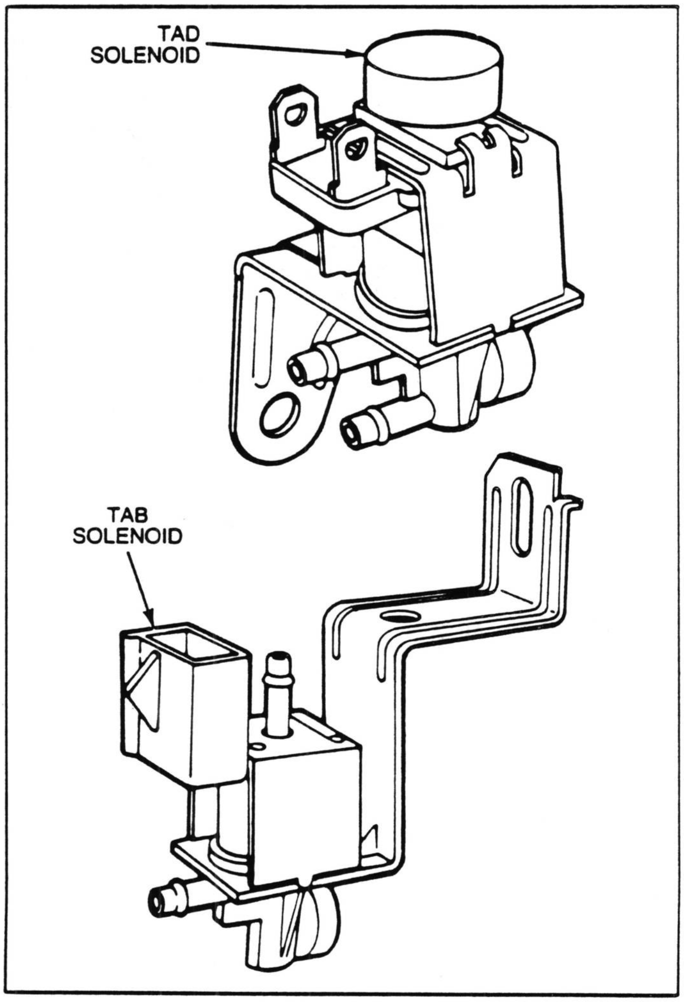


Figure 28. 2.3L TAB/TAD

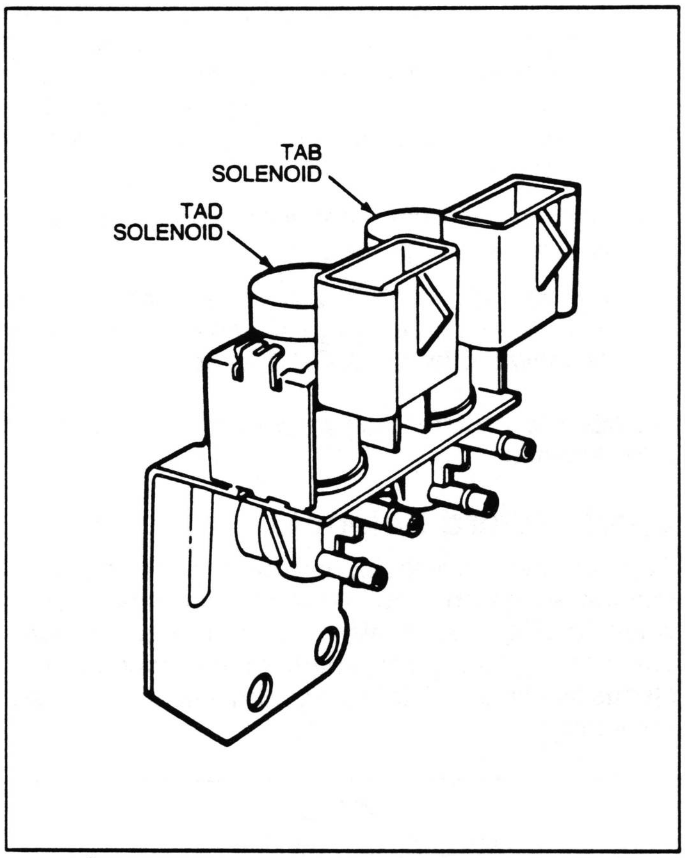


Figure 29. 4.9L TAB/TAD

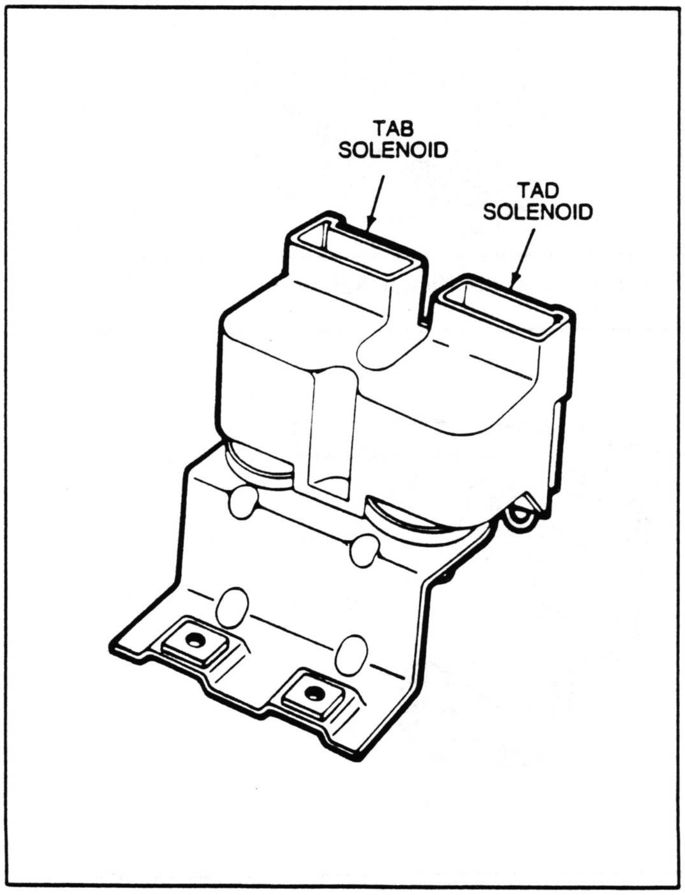


Figure 30. V6-V8 TAB/TAD

Throttle Kicker Devices — V6 and V8 Engines

Throttle Kicker Solenoid (TKS)

The MCU system senses both engine RPM and coolant temperatures. It is through these signals that the throttle kicker solenoid knows when to activate the throttle kicker actuator to ensure a more consistent engine idle. This feature helps the MCU system in maintaining:

- Emissions control by running the engine within a specified engine speed.
- Air/fuel control by providing an adequate air intake through the carburetor.

When certain engine conditions are encountered such as warm-up, overheating or when the air conditioning is turned on, the MCU module sends an output signal to the throttle kicker solenoid. The solenoid, in turn, activates the actuator to improve the quality of the engine idle by providing a larger throttle opening. Better engine idle improves the engine warm-up period, increases coolant circulation and cooling fan speeds during overheat periods, and compensates for the engine load caused by the air conditioning compressor (Fig. 31).

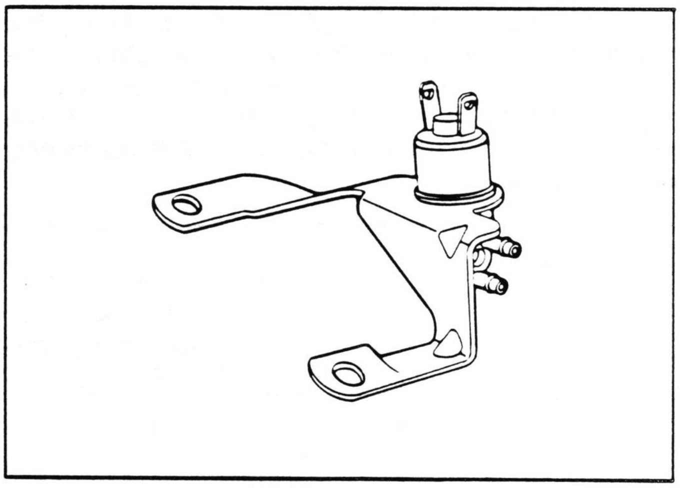


Figure 31. Throttle Kicker Solenoid

Throttle Kicker Relay

The throttle kicker relay enables the A/C clutch circuit to operate the throttle kicker directly without any interaction with the MCU system. However, the MCU can also energize the throttle kicker solenoid through the relay to increase RPM for cold starts or overheat conditions (Fig. 32).

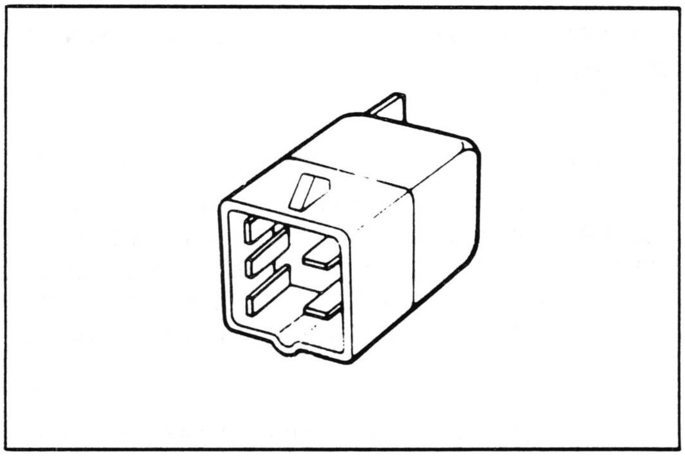


Figure 32. Throttle Kicker Relay

Throttle Kicker Actuator

When the MCU module sends an input signal to the throttle solenoid during engine idle, the solenoid admits manifold vacuum to the diaphragm in the throttle kicker actuator. The diaphragm shaft extends a certain length and restricts the throttle from closing. This then allows more air to flow through the carburetor, increasing the engine idle speed. When the need for an increased idle speed is no longer necessary, the MCU module stops the output signal and the diaphragm collapses, returning the engine to a normal idle speed (Fig. 33).

Canister Purge (CANP)

The MCU module sends an output signal to the canister purge solenoid (Fig. 34) so it can purge the evaporative fuel vapors that have collected in the carbon canister. When the purge valve operates, fuel vapors flow through the canister purge solenoid and enter the intake manifold to be burned with the incoming air/fuel mixture.

- After the engine is started and following a set delay period, the solenoid starts purging vapors from the carbon canister and continues to purge as long as the engine has reached a predetermined RPM and is not overheated or underheated.
- At closed throttle (open loop mode) the carbon canister is not purged.
- It is normal if there is a slight delay of operation when the canister purge solenoid is activated or deactivated by the MCU system.

NOTE: *The canister purge solenoid is not used on 2.3L engines.*

Spark Retard Solenoid

At wide-open throttle (open loop mode), the MCU module sends an output signal to the spark retard solenoid (Fig. 35) to alert it of the engine's over-advanced ignition. The spark retard solenoid then bleeds air into the distributor control vacuum to retard the ignition.

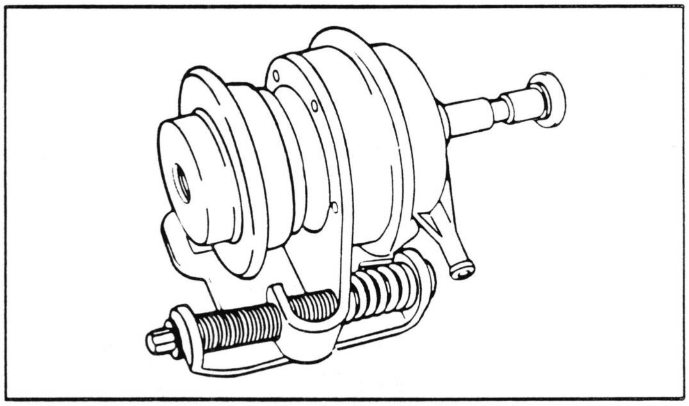


Figure 33. Throttle Kicker Actuator

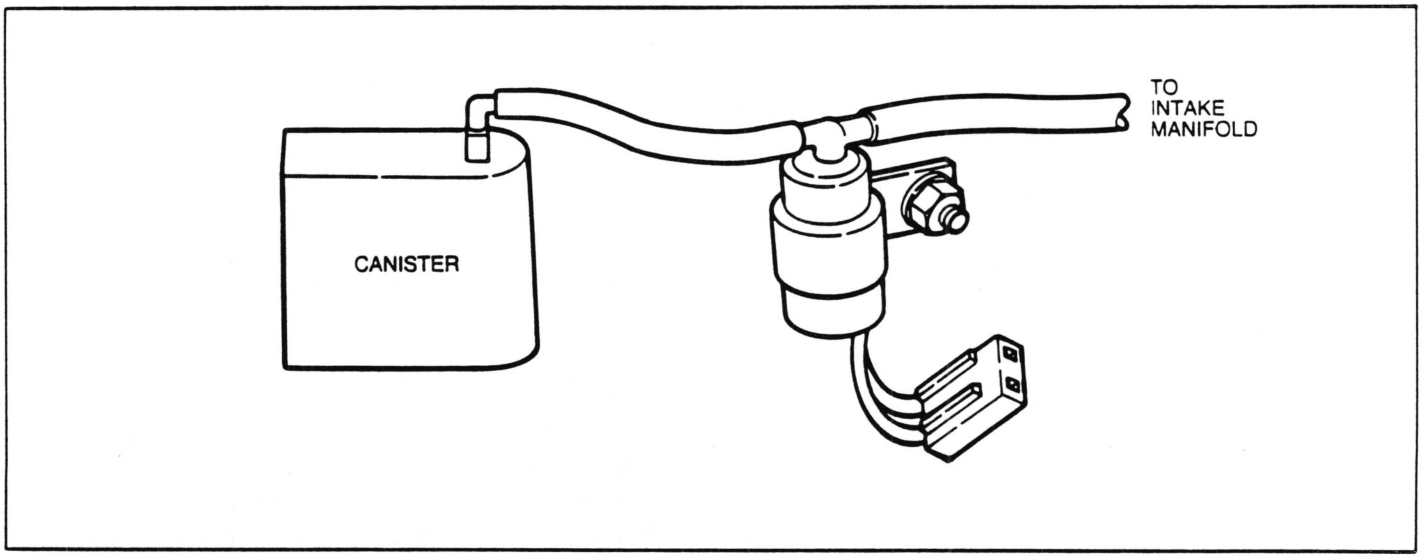


Figure 34. Canister Purge Solenoid

FORD MICROPROCESSOR CONTROL UNIT (MCU)

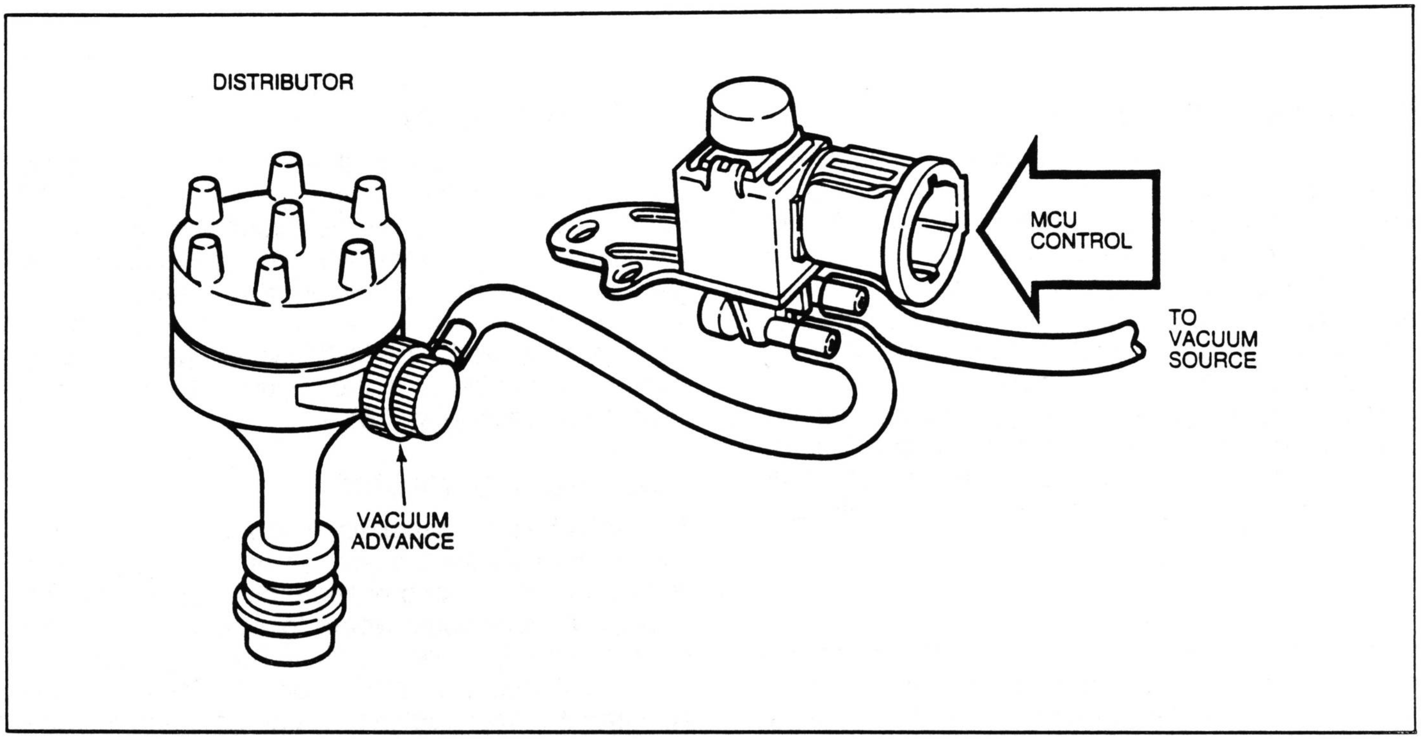


Figure 35. Spark Retard Solenoid

MCU INPUT AND OUTPUT COMPONENTS

The following chart shows the various inputs and outputs related to the MCU system.

MODEL YEAR/ENGINE SIZE	INPUT COMPONENTS	OUTPUT COMPONENTS
1980-84 — 2.3L 1983-84 — 2.0L	EGO Sensor TACH Signal SWITCHES Low Coolant Temp. Idle/Decel Vacuum (2.3L) WOT/Crowd Vacuum (2.3L) Road Load Vacuum (2.0L) Dual-Temperature (2.9L)	TAB TAD FBC CANP
1981-83 — 4.9L	EGO Sensor TACH Signal Knock Sensor Vacuum Zone Switches	TAB TAD FBC
1980-83 — 5.0L/5.8L 1984-86 — 5.9L 1981 — 4.2L	EGO Sensor BARO Sensor Knock Sensor TACH Signal SWITCHES Dual-Temperature Mid-Temperature Zoned Vacuum	CANP TAB TAD FBA TK Solenoid

FORD MICROPROCESSOR CONTROL UNIT (MCU)

MCU DIAGNOSIS

Preliminary Inspection

As in any service procedure, a routine inspection of the system by sight and touch is the best way to start. Broken or frayed wires, loose connections, obvious shorts, disconnected or damaged vacuum hoses, and similar problems can be discovered and corrected before proceeding with the test. Unattached harness connectors may be present for components not included in the specific application. If there is nothing to connect them to, they may be ignored. Examine the components which are in or affect the MCU system. Typical locations for these components are shown in the Engine Emissions Diagnosis Manual (Volume H).

In situations where the condition is intermittent, it is extremely important to question the customer carefully to determine when or under what driving situations the condition occurs. Then, try to duplicate the situation that causes the condition.

A fouled spark plug, disconnected vacuum hose, broken wire, a bad electrical wire crimp, or wrong routing of hoses are conditions that can produce a wrong reading on the MCU test. It is possible to replace an MCU component and still not eliminate the problem. Make sure none of these conditions are present.

No-Start Condition

If the vehicle will not start, there are several possible systems that may be causing the problem. An MCU system can cause a no-start condition only if the TACH input circuit to the MCU module is shorted to ground, bypassing the ignition coil primary. Such a short could be either in the wiring harness or in the MCU module itself. The MCU system can be easily eliminated as a cause of the condition by performing the following test (Fig. 36).

Self-Test Connector

The MCU has the capability to diagnose a malfunction within its own system. (It is not designed to diagnose malfunctions outside the MCU system.) It advises the technician where to look for MCU problems through the use of a Self-Test computer program built into the MCU module. Standard test equipment (analog voltmeter) can be used to check out the system operation, or a special tester can be used to simplify the testing procedure on the MCU Self-Test connector (Fig. 37).

When the analog voltmeter or special tester is installed on the connector and the system is triggered, the Self Test simulates a variety of engine operating conditions and evaluates all the responses received from various MCU components, so that any abnormal operating condition can be detected.

OPERATION	RESULT	ACTION
1. Harness Check		
Disconnect harness from ignition module and coil.	• More than 1000 ohms.	• No problem in MCU system — See Shop Manual for further testing.
Check circuit 11 (dark green/yellow dot wire) at coil connector for short (Fig. 39).	• Less than 1000 ohms.	• See Step 2.
2. MCU Module Check		
Disconnect harness from MCU module.	• More than 1000 ohms.	• Replace MCU Module and re-check for short.
Re-check circuit 11 (dark green/yellow dot wire) for short to ground (Fig. 40).	• Less than 1000 ohms.	• Repair circuit 11 and re-check for short.

Figure 36. No-Start Diagnostic Chart

FORD MICROPROCESSOR CONTROL UNIT (MCU)

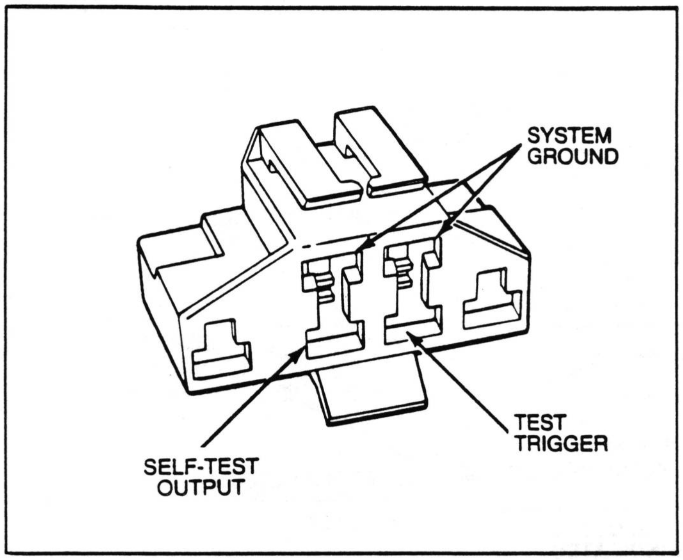


Figure 37. Self-Test Connector

Self Test

As previously stated, the MCU system incorporates a Self-Test connector for isolating problems in the MCU system.

A received response to the initiated Self-Test is reported, through the Self-Test connector, to the technician as a pulsing series of electrical outputs that will appear on one of two testing devices: an analog voltmeter (Fig. 38) or Self-Test automatic readout (STAR) tester (Fig. 39).

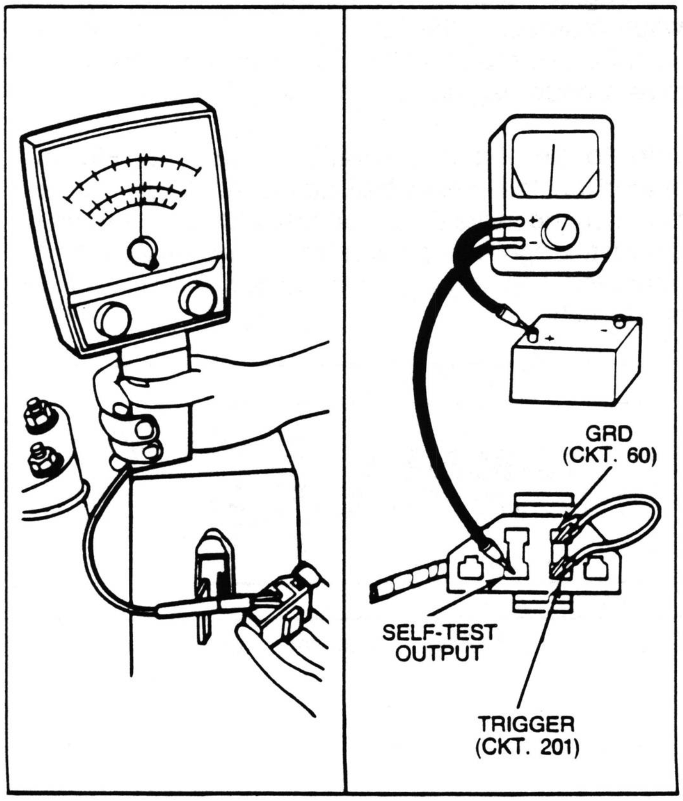


Figure 38. MCU Self-Test with Analog Voltmeter

The series of electrical pulses is called a service code, representing a two-digit number. The two-digit service code indicates to the technician the nature of the MCU problem.

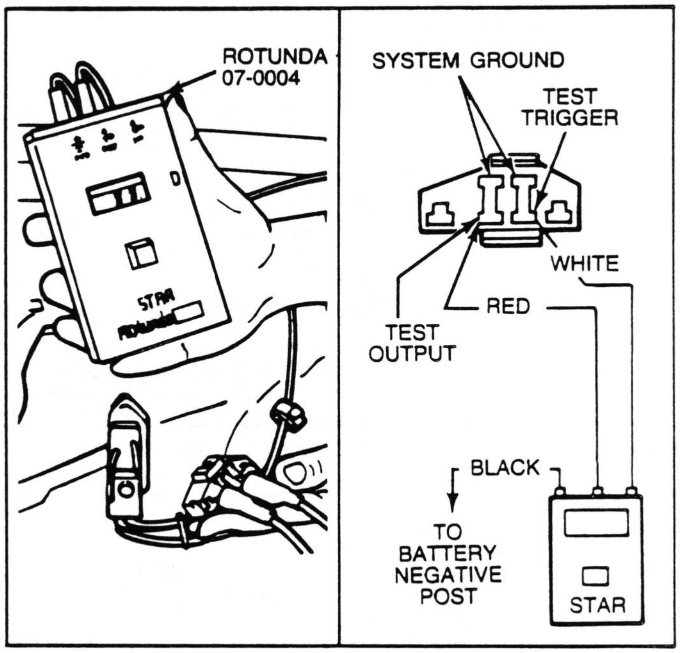


Figure 39. MCU Self-Test with STAR Tester

Self Test With Analog Voltmeter

When a service code is reported on the analog voltmeter (Fig. 40), it represents itself as a pulsing or sweeping movement of the voltmeter's needle across the dial face of the voltmeter. Therefore, a single-digit number of three will be reported by three needle pulses (sweeps). However, as previously stated, a service code is represented by a two- digit number, such as 3-2. As a result, the Self-Test's service code of 3-2 will appear on the voltmeter as three needle pulses (sweeps), then after a two-second pause, the needle will pulse (sweep) twice more.

Self Test With STAR Tester

The STAR tester will display a two-digit service code to indicate the condition of the MCU system (Fig. 41).

Testing Procedures

The Shop Manual for the vehicle being serviced contains detailed testing procedures for isolating problems in the MCU system for each applicable engine.

In addition, an Electrical and Vacuum Troubleshooting Manual is available which contains detailed circuit diagrams and troubleshooting hints for each engine within the applicable car or truck line.

FORD MICROPROCESSOR CONTROL UNIT (MCU)

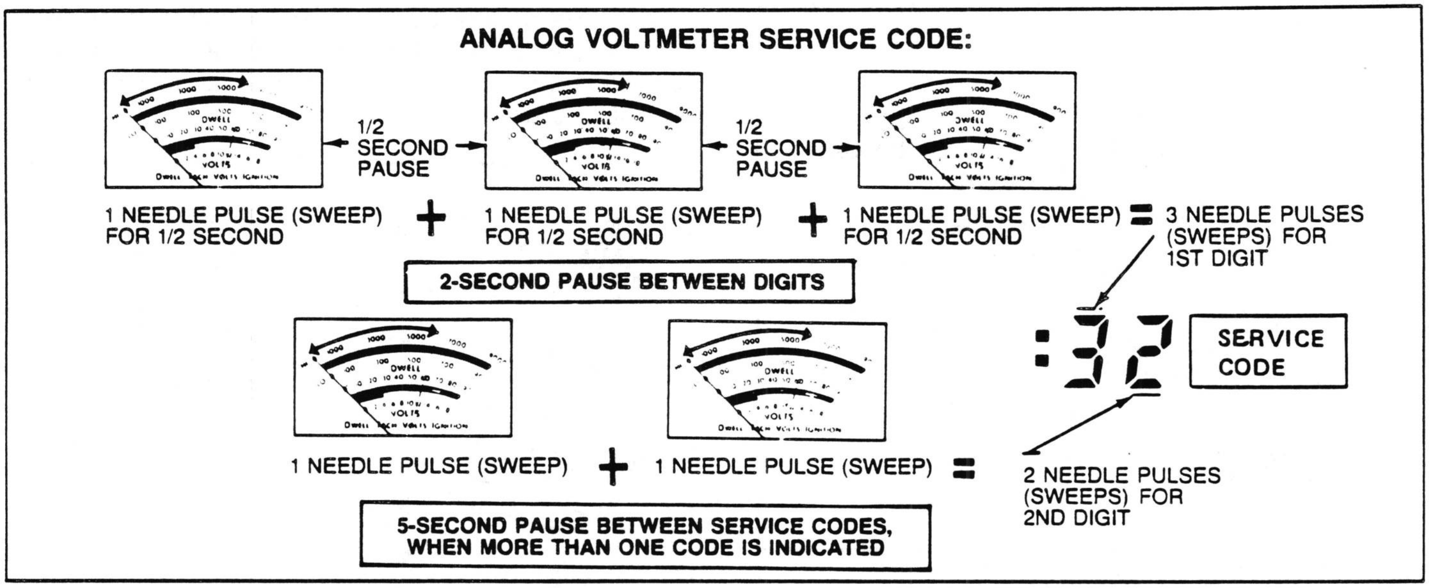

ANALOG VOLTMETER SERVICE CODE:
1/2 SECOND PAUSE
1/2 SECOND PAUSE
1 NEEDLE PULSE (SWEEP) FOR 1/2 SECOND
+
1 NEEDLE PULSE (SWEEP) FOR 1/2 SECOND
+
1 NEEDLE PULSE (SWEEP) FOR 1/2 SECOND
=
3 NEEDLE PULSES (SWEEPS) FOR 1ST DIGIT
2-SECOND PAUSE BETWEEN DIGITS
: 3 2
SERVICE CODE
1 NEEDLE PULSE (SWEEP)
+
1 NEEDLE PULSE (SWEEP)
=
2 NEEDLE PULSES (SWEEPS) FOR 2ND DIGIT
5-SECOND PAUSE BETWEEN SERVICE CODES, WHEN MORE THAN ONE CODE IS INDICATED

Figure 40. Analog Voltmeter Service Codes

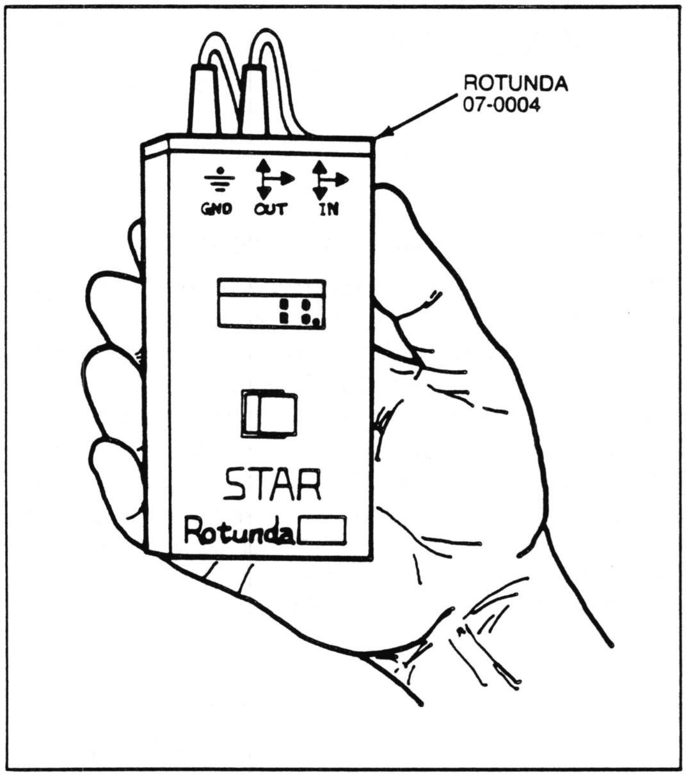


Figure 41. STAR Service Code

Identification and Service

Removal and installation of the components in the MCU system does not require any special tools or operations.

The significant step in servicing the MCU system is to make sure that a correct part is used when replacement is necessary. Various calibrations are required for the MCU system to correctly compensate for the different vehicle configurations; for example, manual or automatic transmission or air conditioning. To obtain the correct service part, the engine size and calibration code are required.

Engine Calibration Code

The engine calibration code begins with a numeral which represents the last digit of the vehicle model year. For example, a 1981 model year engine would have a code beginning with the numeral 1.

Refer to the engine calibration code label (Fig. 42) located on the timing belt cover for 4-cylinder engines, on the valve cover for 4.9L (300 CID) engines, and on the right valve cover for V6 and V8 engines to obtain the engine calibration base number (06-N or simply 6N).

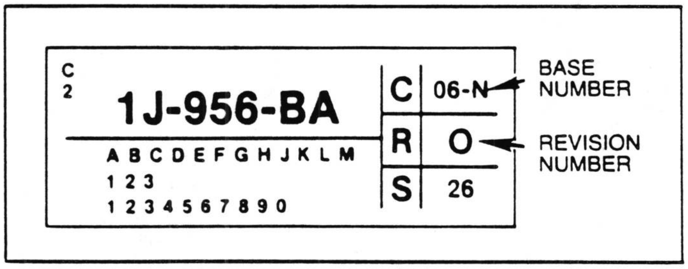


Figure 42. Typical Engine Calibration Code Label

FORD MICROPROCESSOR CONTROL UNIT (MCU)

Now, add the calibration revision number, if any. In this example, there is none. Therefore, the engine calibration code is 1-6N-RO.

Looking at the cross-reference in this bulletin shows that the correct part number for the MCU in this calibration should be E1ZF-12A651-DA (Motorcraft DY-312). Looking at the part number on the MCU itself should confirm this (Fig. 43).

This complete part number for the typical unit shown in Figure 43 is E1ZF-12A651-DA. The basic part number which is found on all MCU assemblies is 12A651. An MCU calibration code number is also included — E1ZF-DA (GE). This number will also be found in some Ford Motor Company Parts Listings.

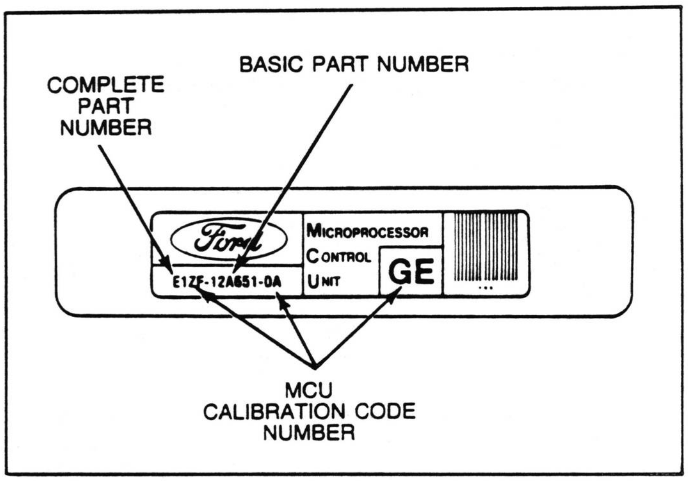


Figure 43. Typical MCU Part Number Label

SERVICE CODE EXPLANATION

Code	2.3L	4.9L	8-Cyl.
11	System OK	System OK	System OK
12	N.A.	N.A.	Idle Speed Incorrect
25	N.A.	N.A.	Knock Detection Inoperative
33	RUN Test Not Initiated	RUN Test Not Initiated	N.A.
41	EGO Always Lean	EGO Always Lean	EGO Always Lean
42	EGO Always Rich	EGO Always Rich	EGO Always Rich
44	Thermactor Air System Problem	Thermactor Air System Problem	Thermactor Air System Problem
45	Thermactor Air Always Upstream	Thermactor Air Always Upstream	Thermactor Air Always Upstream
46	Thermactor Air Not Bypassing	Thermactor Air Not Bypassing	Thermactor Air Not Bypassing
51	LOW-Temp. Switch Open	LOW-Temp. Vacuum Switch Open	HI/LO Vacuum Switch(s) Open
52	Idle Tracking Switch Open	Wide-Open-Throttle Vacuum Switch Open	N.A.
53	Wide-Open-Throttle Vacuum Switch Open	Crowd Vacuum Switch Open	DUAL-Temp. Switch Open
54	N.A.	N.A.	MID-Temp. Switch Open
55	N.A.	N.A.	MID-Vacuum (MIDVAC) Switch Open
56	N.A.	Closed-Throttle Vacuum Switch Open	N.A.
61	N.A.	N.A.	HI/LO Vacuum Switch(es) Closed
62	Idle Tracking Switch Closed	Wide-Open-Throttle Vacuum Switch Closed	Altitude Switch*
63	Wide-Open-Throttle Vacuum Switch Closed	Crowd Vacuum Switch Closed	N.A.
65	Altitude Switch*	N.A.	MID-Vacuum (MIDVAC) Switch Closed
66	N.A.	Closed-Throttle Vacuum Switch Closed	N.A.

*Not on all calibrations.

FORD MICROPROCESSOR CONTROL UNIT (MCU)

CROSS REFERENCE PARTS LISTING

Since the engine calibration code is the only way to determine the correct part number for replacement parts, this listing is by the calibration code number for the years 1980/1985.

1980

CALIBRATION CODE NO.	ENGINE	PART NAME	FORD PART NUMBER	MOTORCRAFT PART NUMBER
0-2T-R0 0-2T-R10	2.3L (Calif.) (Manual Transmission)	MCU Assembly EGO Sensor	E0EE-12A651-AB D9EE-9F472-AB D9EE-9F472-AA* E0DE-9F472-AA*	DY 233B — — —
0-1P-R0	2.3L (Calif.) (Automatic Transmission)	MCU Assembly EGO Sensor	E0EE-12A651-AB D9EE-9F472-AB D9EE-9F472-AA* E0DE-9F472-AA*	DY 233B — — —

1981

CALIBRATION CODE NO.	ENGINE	PART NAME	FORD PART NUMBER	MOTORCRAFT PART NUMBER
1-5Q-R0 1-5Q-R10	2.3L (50 States) (Manual Transmission)	MCU Assembly EGO Sensor	E1ZF-12A651-CA E0DE-9F472-AA D9EE-9F472-AA* D9EE-9F472-AB*	DY 309 — — —
1-5R-R10 1-5R-R11	2.3L (Calif.) (Automatic Transmission)	MCU Assembly EGO Sensor	E1ZF-12A651-CA E0DE-9F472-AA	DY 309 —
1-6N-R0 1-6N-R10 1-6N-R12	2.3L (Calif.) (Automatic Transmission)	MCU Assembly (Std.) (Police/Taxi) EGO Sensor	E1ZF-12A651-DA E1ZF-12A651-EA E0DE-9F472—AA D9EE-9F472-AA* D9EE-9F472-AB*	DY 312 DY 325 — — —
1-6V-R0 1-6V-R12	2.3L (50 States) (Automatic Transmission)	MCU Assembly (Std.) (Police/Taxi) EGO Sensor	E1ZF-12A651-DA E1ZF-12A651-EA E0DF-9F472-AA D9EE-9F472-AA* D9EE-9F472-AB*	DY 312 DY 325 — — —
1-18M-R1	4.2L	MCU Assembly (Std.) (Police) Dual Temp. Switch EGO Sensor	E1BF-12A651-RA E1BF-12A651-TA E1AE-12B513-AA E0DE-9F472-AA E1AF-9F472-AA* E1SF-9F472-AA*	DY 316 DY 316A — — — —
1-18N-R0 1-18R-R0	4.2L	MCU Assembly (Std.) (Police/Taxi) Dual Temp. Switch EGO Sensor	E1BF-12A651-JA E1BF-12A651-UA E1AE-12B513-AA E0DE-9F472-AA	DY 321 DY 321A — —
1-18T-R0	4.2L	MCU Assembly Dual Temp. Switch EGO Sensor	E1SF-12A651-KA E1AE-12B513-AA E0DE-9F472-AA	DY 320 — —

*Acceptable Alternative Part Number

FORD MICROPROCESSOR CONTROL UNIT (MCU)

1981 (Cont'd.)

CALIBRATION CODE NO.	ENGINE	PART NAME	FORD PART NUMBER	MOTORCRAFT PART NUMBER
1-18U-R0	4.2L	MCU Assembly (Std.)	E1BF-12A651-RA	DY 316
		(Police)	E1BF-12A651-TA	DY 316A
		Dual Temp. Switch	E1AE-12B513-AA	—
		EGO Sensor	E1AF-9F472-AA	—
			E0DE-9F472-AA*	—
			E1SF-9F472-AA*	—
1-20A-R0 1-20A-R1 1-20B-R1	5.0L	MCU Assembly (Std.)	E1SF-12A651-HA	DY 319
		(Police)	E1SF-12A651-PA	DY 319A
		Dual Temp. Switch	E1AE-12B513-AA	—
		EGO Sensor	E0DE-9F472-AA	—
			E1AF-9F472-AA*	—
			E1SF-9F472-AA*	—
1-20N-R0 1-20N-R10	5.0L	MCU Assembly (Std.)	E1SF-12A651-GA	DY 324
		(Police)	E1SF-12A651-NA	DY 324A
		Dual Temp. Switch	E1AE-12B513-AA	—
		EGO Sensor	E0DE-9F472-AA	—
			E1AF-9F472-AA*	—
			E1SF-9F472-AA*	—
1-20T-R0 1-20T-R11	5.0L	MCU Assembly	E1SF-12A651-CA	DY 307
		Dual Temp. Switch	E1AE-12B513-AA	—
		EGO Sensor	E0DE-9F472-AA	—
1-24P-R0 1-24P-R22	5.8L	MCU Assembly (Std.)	E1SF-12A651-FA	DY 322
		(Police)	E1SF-12A651-BA	DY 330
		Dual Temp. Switch	E1AE-12B513-AA	—
		EGO Sensor	E0DE-9F472-AA	—
			E1AF-9F472-AA*	—
			E1SF-9F472-AA*	—
1-24P-R21	5.8L	MCU Assembly (Std.)	E1AF-12A651-EA	DY 328
		(Police)	E1AF-12A651-FA	DY 329
		Knock Sensor	E1AF-12A699-AA	—
		Dual Temp. Switch	E1AE-12B513-AA	—
		EGO Sensor	E0DE-9F472-AA*	—
			E1AF-9F472-AA*	—
			E1SF-9F472-AA*	—
1-24A-R0	5.8L (Automatic Overdrive Transmission)	MCU Assembly	E1SF-12A651-DA	DY 310
		Dual Temp. Switch	E1AE-18B513-AA	—
		EGO Sensor	E0DE-9F472-AA	—
1-51S-R0 1-51S-R10 1-51T-R0 1-52S-R0 1-52T-R0	4.9L (Calif.)	MCU Assembly	E1TF-12A651-CA	DY 300
		EGO Sensor	E1AF-9F472-AA	—
			E0ZE-9F472-AA*	—
				—
				—

*Acceptable Alternative Part Number

FORD MICROPROCESSOR CONTROL UNIT (MCU)

1982

CALIBRATION CODE NO.	ENGINE	PART NAME	FORD PART NUMBER	MOTORCRAFT PART NUMBER
2-05C	2.3L (49 States)	MCU Assembly	E2AF-12A651-CA E2AF-12A651-RA①	DY 370 DY 338
2-05N 2-05P	2.3L (Calif.) (Manual Transmission)	MCU Assembly	E2AF-12A651-CA E2AF-12A651-RA①	DY 370 DY 338
2-06N	2.3L (Calif.) (Automatic Transmission)	MCU Assembly	E2AF-12A651-TA	DY 341
2-14N	3.8L (Calif.) (Automatic Transmission — C510)	MCU Assembly	E2AF-12A651-HA	DY 333
2-14Q 2-14R	3.8L (Calif.) (AOD Transmission)	MCU Assembly	E2AF-12A651-JA	DY 331
1-18T	4.2L (Calif.) (AOD Transmission)	MCU Assembly	E1SF-12A651-KA	DY 320
1-18U	4.2L (49 States) (AOD Transmission)	MCU Assembly	E1BF-12A651-RA	DY 316
2-18Z	4.2L (ALT Compensation) (AOD Transmission)	MCU Assembly	E1BF-12A651-RA	DY 316
2-18Q	4.2 (Calif.) (AOD Transmission)	MCU Assembly	E2AF-12A651-EA	DY 354
2-20R	5.0L (50 States) (AOD Transmission)	MCU Assembly	E2AF-12A651-DA	DY 353
2-20Z	5.0 (ALT Compensation) (49 States) (AOD Transmission)	MCU Assembly	E2AF-12A651-AA	DY 336
2-20B	5.0L (ALT Compensation) (49 States) (AOD Transmission)	MCU Assembly	E2AF-12A651-BA	DY 374
1-20N	5.0L (50 States) (AOD Transmission)	MCU Assembly	E1SF-12A651-GA	DY 324
2-24P	5.8L (50 States) (AOD Transmission)	MCU Assembly	E2AF-12A651-FA	DY 350
2-51S	4.9L (Calif.) (Manual Transmission)	MCU Assembly	E2AF-12A651-LA	DY 347
2-51T	4.9L (Calif.) (Manual Transmission)	MCU Assembly	E2AF-12A651-NA	DY 361

①Model Year Running Change

FORD MICROPROCESSOR CONTROL UNIT (MCU)

1983

CALIBRATION CODE NO.	ENGINE	PART NAME	FORD PART NUMBER	MOTORCRAFT PART NUMBER
2-52S 2-52T	4.9L (Calif.) (Automatic Transmission)	MCU Assembly	E2AF-12A651-MA	DY 348
Passenger Car	2.3L			
03-05C-R01		MCU Assembly	E3ZZ-12A651-B	DY-388
03-05N-R00				
03-05P-R01		EGO Sensor	E3FZ-9F472-A	—
03-06N-R01		Dual Temp. Switch	E1AZ-12B513-A	—
03-06N-R10				
Police Only	5.8L			
02-24P-R10		MCU Assembly	E4AZ-12A651-A	DY-350-A
02-24P-R11			E3FZ-9F472-A	
		EGO Sensor	E1AZ-12B513-A	—
		Dual Temp. Switch	E3AZ-12A699-A	—
		Knock Sensor		—
Light Truck	2.0L			
03-41P-R02		MCU Assembly	E3TZ-12A651-A	DY-378
03-41P-R12				
		EGO Sensor	E1AZ-9F472-A	—
03-41P-R15		MCU Assembly	E3TZ-12A651-A	DY-378
		EGO Sensor	E3FZ-9F472-A	—
03-41S-R16		MCU Assembly	E3TZ-12A651-P	DY-422
03-41S-R18		EGO Sensor	E3FZ-9F472-A	—
03-49G-R17	2.3L	MCU Assembly	E3TZ-12A651-N	DY-419
		EGO Sensor	E3FZ-9F472-A	—
03-49H-R16		MCU Assembly	E3TZ-12A651-M	DY-418
		EGO Sensor	E3FZ-9F472-A	—
03-49S-R01		MCU Assembly	E3TZ-12A651-D	DY-381
03-49S-R10		EGO Sensor	E1AZ-9F472-A	—
03-49S-R11				
03-49S-R15		MCU Assembly	E3TZ-12A651-L	DY-417
		EGO Sensor	E3FZ-9F472-A	—
03-49T-R17		MCU Assembly	E3TZ-12A651-D	DY-381
		EGO Sensor	E3FZ-9F472-A	—
03-50H-R17		MCU Assembly	E3TZ-12A651-C	DY-380
		EGO Sensor	E3FZ-9F472-A	—
03-50S-R10		MCU Assembly	E3TZ-12A651-C	DY-380
03-50S-R11		EGO Sensor	E1AZ-9F472-A	—
03-50S-R17				
3-51P-R00	4.9L	MCU Assembly	E3TZ-12A651-J	DY-402
		EGO Sensor	E3FZ-9F472-A	—
		Knock Sensor	E2AZ-12A699-A	—
03-51R-R00		MCU Assembly	E3TZ-12A651-E	DY-397
			E3FZ-9F472-A	—

FORD MICROPROCESSOR CONTROL UNIT (MCU)

1983 (Cont'd.)

CALIBRATION CODE NO.	ENGINE	PART NAME	FORD PART NUMBER	MOTORCRAFT PART NUMBER
Light Truck (Cont'd.)	4.9L			
03-51R-R10		MCU Assembly	E3TZ-12A651-T	DY-432
03-51S-R10		EGO Sensor	E3FZ-9F472-A	—
03-51S-R00		MCU Assembly	E3TZ-12A651-E	DY-397
		EGO Sensor	E3FZ-9F472-A	—
03-51T-R00		MCU Assembly	E3TZ-12A651-K	DY-403
03-52R-R00		EGO Sensor	E3FZ-9F472-A	—
03-52S-R0				
03-52T-R00				
03-51T-R10		MCU Assembly	E3TZ-12A651-F	DY-398
03-52R-R10		EGO Sensor	E3FZ-9F472-A	—
03-52S-R10				
03-52T-R10				

1984

Car/H.O.	5.8L			
04-24P-R00		MCU Assembly	E4AZ-12A651-A	DY-350-A
04-24P-R11		EGO Sensor	E6DZ-9F472-A	—
			E6ZZ-9F472-A*	—
			E6ZZ-9F472-B*	—
		Knock Sensor	E3AZ-12A699-A	—
Light Truck	2.0L			
03-41P-R15		MCU Assembly	E3TZ-12A651-A	DY-378
		EGO Sensor	E3FZ-9F472-A	—
03-41S-R18		MCU Assembly	E3TZ-12A651-P	DY-422
		EGO Sensor	E3FZ-9F472-A	—
03-49G-R20	2.3L	MCU Assembly	E3TZ-12A651-N	DY-419
03-49G-R21		EGO Sensor	E3FZ-9F472-A	—
03-49H-R17		MCU Assembly	E3TZ-12A651-M	DY-418
03-49H-R18		EGO Sensor	E3FZ-9F472-A	—
03-49S-R16		MCU Assembly	E3TZ-12A651-L	DY-417
03-49S-R17		EGO Sensor	E3FZ-9F472-A	—
03-49T-R20		MCU Assembly	E3TZ-12A651-D	DY-381
03-49T-R21		EGO Sensor	E3FZ-9F472-A	—
03-50H-R18		MCU Assembly	E3TZ-12A651-C	DY-380
03-50S-R18		EGO Sensor	E3FZ-9F472-A	—

1985

Passenger Car H.O.	5.8L			
04-24P-R00		MCU Assembly	E4AZ-12A651-A	DY-350-A
04-24P-R11		EGO Sensor	E6DZ-9F472-A	—
			E6ZZ-9F472-A*	—
			E6ZZ-9F472-B*	—
		Knock Sensor	E3AZ-12A699-A	—

*Acceptable Alternative Part Number

1986 SERVICE PUBLICATIONS

order form

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